



Ways of creating Arabic Scientific Terminology

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ABSTRACT

The article deals with the analysis of different ways of creating Arabic scientific terminology. Arabic scientific style includes the terminology that represents different scientific areas functioning in all Arabic countries. These ways can be classified as: giving the meaning of terms; construction of new terms according to the rules of word formation; reduction and ellipsis of terms; direct term borrowing, all the above-mentioned being subject to further analysis. Main objectives of academic style, the specific features and certain lexical and grammatical peculiarities of the Arabic scientific terminology are under consideration as well. Discussed in the paper are linguistic and extra-linguistic factors influencing the ways of scientific term formation and the ways of translating Arabic scientific texts such as development of adequate research methods and rise of the degree of cognition objectivity. Appearance of new concepts, penetration of new technical appliances into the Arabic countries affecting lexical systems of the dialects is pointed out.

Key words: scientific style, terminology, ellipsis, word formation, nominalization, the Arabic language.



1. INTRODUCTION

Academic register is “the speech system specially designed to optimize people’s communication in the scientific sphere of human activity” (Vasilyeva 1976: 5).

Academic style is used when it is necessary to convey information fully and objectively, to prove certain scientific data, to present the results of new investigations, to systemize and concisely state scientific agenda, which will transmit certain scientific knowledge in different fields of science. Thus, the main function of scientific style is intellectual communicative.

Specificity of scientific activity stipulates main objectives of this style. They are: proving certain statements and hypotheses, their argumentation; precise and systemized statement of scientific problems in order to characterize, define and explain the phenomena of nature and social life as well as to convey accumulated knowledge (Razinkina 1972: 27). With the help of a set of organized and purposefully selected language means scientific facts are proved and described in scientific works.

Appearance of scientific style is attributed by the Arabic linguists, including I. Madkur, to the second half of the XIXth century, when scientific studies started developing. With time passing “...a special language, created to serve scientific activity,” was being formulated (Makdur 1966: 2).

2. MATERIALS AND METHODS

Being diverse, the sphere of science involves not only all scientific fields functioning in an Arabic country at a given period of time, but also the process of scientific work, its results, both published and orally presented. Variability as a feature of language system is the brightest demonstration of its evolution and takes place on every language level (Shemshurenko, Deputatova, Biktagirova 2015: 87)

Specificity of science communication stipulates the peculiarities of the language used in it. This sphere is, as a rule, expressed by the literary language represented by the most perfect variant. However, the history of Arabic peoples saw rather long periods of superiority of foreign languages in the scientific sphere (in particular, English, French, etc.). Until now, in spite of numerous attempts to make the science more Arabic in terms of language, some Arabic nations still use English or French in this sphere.



Alongside the literary language, scientific activity is realized through local dialects. They pose an oral variation of scientific discourse. It should be said though that the factor of the impact of education level should be borne in mind when we talk about the correlation between the two forms of the Arabic language: literary and dialectal. Under the influence of science technical revolution in general and certain socio-economic terms of each Arabic nation in particular, the literary language functioning in a given country undergoes major changes such as, for instance, its vocabulary gets enlarged by a huge amount of new word-terms.

Appearance of new concepts, penetration of new technical appliances into the Arabic countries also affects lexical systems of the dialects. Increase in the level of general education leads to the expansion of literary norms with their following penetration into dialects. Constant interaction and mutual influence of the literary language and dialect takes place in the process of their convergence in the scientific sphere in the Arabic nations.

When translating Arabic scientific texts we should be aware of the fact that their formation is influenced by a number of extralinguistic factors. To these belong: development of adequate research methods, rise of the degree of cognition objectivity, which are accompanied by the tendency to brevity, logical sequencing, and clarity in the process of scientific studies.

In stylistic terms, any scientific research should rest on logical sequencing and logical perception of information. Bearing in mind that logical sequencing is the main property of scientific data, academic register is determined by the peculiar organization of scientific information characterized by systemized and step-by-step stating of science issues.

Since scientific studies reflect the human rational activity, the language of such works is characterized by logical layout consisting of certain lexical and grammatical peculiarities.

Endeavors to make the contents of statements correspond to the language forms in the most adequate way leads to the use of numerous terms in scientific studies. It is explained by the fact that it is impossible to express a certain idea or to compile proper scientific description without the use of special language means which unambiguously interpret the concepts in question.



Scientific texts are characterized by using the main meanings of words being logical objective, which reflects the objective side of phenomena and things around us. The words which are used to denote generic properties of the objects and phenomena of the outside reality lose the connection with any imagery and figurativeness, becoming more or less abstract. The use of words in this precise meaning is typical of scientific discourse.

Specificity of scientific works is as well characterized by the subordination of word order to the logical layout, by using formal vocabulary and following strict written laws. Lexical means which are used in scientific texts represent the abovementioned phenomenon adequately and clearly. That is why indirect and contextual meanings are anything but a frequent case. Scientific discourse has almost no metaphors, hyperboles, similes, and other figurative means. Figurative language is sometimes used in scientific works merely as an intermediate device which usually strengthens and accentuates the logically formulated thought.

Nowadays, the big role in creating Arabic terms is played by foreign terminological systems which are copied and borrowed by the Arabic terminological system. The following patterns are used in this process:

- 1) termination of special meanings of currently existing or previously existing lexical units;
- 2) formation of new terms according to the word-building models which exist in the language;
- 3) translation of terms and terminological combinations and their subsequent shortening through processes of ellipsis or word compounding;
- 4) direct borrowing of terms (Belkin 1975: 119).

The use of words with a common meaning to form terms did not become widely spread in the Arabic scientific texts. However, there are examples of the use of classical words in the terminological meanings: *ذرة physics* “atom” < “the smallest particle, modicum”, *نواة physics* “core” < “a core of a fruit”.

It was common practice when terms were formed basing on the general lexis of a language by finding precise semantic equivalents for foreign terms: *نظير* “isotope” < “similar” (*Greek isotopos*), *طيف* “spectre” < “vision” (*Lat. spectrum*), *فضاء* “cosmos” < “open space” (*Engl. space*).



The same method was used in the following terms: *electr.* شحن “charging”, *mech.*, *electr.* مقاومة “resistance”, *electr.* تردد “frequency”, etc.

The calquing is based on the rules of arabization defined as “the adaptation of non-Arabic terms to Arabic by applying the rules of the phonological and sometimes morphological systems of the language to the terms” (Stetkevych, 1970).

The process of calquing may be as well realized via morphological derivation or arabization explained as “pronouncing the foreign name according to the linguistic rules of Arabic...” (*Ibn Manzūr*, 1955: 589). In this case, terms may be formed according to the following grammatical patterns:

- 1) Masdars: *geod.* تثليث ”triangulation”, *phys.* استقطاب “polarization”;
- 2) Participles: مكثف “condenser”, مولد “generator”;
- 3) Names of devices: محقن “injector”, منفث “nozzle” (of the jet engine);
- 4) Diminutive names: جسيمة “corpuscle”, حريرة “calorie”.

Composed terms in the Arabic language are often shortened in different ways:

1) *Part or full modification of the full terminological word-combination*: For instance, instead of terminological combination قابلية الانتاج “productivity” the term انتاجية is used; the combination دفاع مضاد للطائرات “air defense” is substituted by the combination دفاع جوي; instead of the description تجهيز بالمعدات الميكانيكية “fitting-out with mechanical equipment”, i.e. mechanization, the term ميكنة, which was a borrowing, started to be used.

2) *Ellipsis of term combinations*: Ellipsis is falling out of some elements of composed names, which denote various phenomena and concepts: رائد الفضاء > رائد “astronaut”, مدفعية مضادة للطائرات > مدفعية مضادة “antiair artillery”, etc.

The most typical pattern in composed attribute constructions which has an attributive adjective in the Arabic language is the ellipsis of *the determinatum*. In such cases the process of semantic fusion of two meanings into one is lined up with grammatical process of substantivation of the adjective (Belkin 1975: 124). To this may refer: تعاونية “a cooperative store” instead of جمعية تعاونية; مسرحية “a play” from رواية مسرحية; برقية “a telegram” instead of رسالة برقية; دورية “periodical publication” from نشرة دورية; افتتاحية “the leading article” instead of مقالة افتتاحية, etc. Often elliptized are the following homogeneous combinations:

- a) *names of school levels*: ابتدائية “primary school” ВМЕСТО ابتدائية; مدرسة ابتدائية;
- b) *names of languages*: العربية “the Arabic language” instead of اللغة العربية;



- c) *names of plane classes*: نفاثة “a jet plane”, مقاتلة “a fighter plane”, قاذفة مقاتلة “a bomber fighter” with the falling out طائرة “plane” component;
- d) *names of ship classes*: ناقلة النفط instead of ناقله “an oil tanker”, حاملة instead of الطائرات حاملة “a plane carrier”», كاسحة instead of كاسحة الألغام “a mine sweeper», عابرة instead of “عابرة المحيطات” “a trans-ocean liner”, where the word سفينة “ship” or its equivalent is avoided;
- e) *names of means of transportation*: شاحنة “a lorry”, حافلة “a bus”, مقطورة “a trailer” with the implication of عربة or سيارة “an automobile”.

Attributive adjectives in attributive constructions are rarely elliptized. Among the few examples reduction may be pointed out: نقابة مهنية “a trade union” into نقابة and تضخم مالي into تضخم “inflation”.

Determined noun in the “idafa” construction is as well rarely elliptized. It may be shown by the examples of نقطة الاعتدال which إعتدال results in “the equinox climax” while درجة الحرارة is reduced to حرارة “temperature”. The cases of elliptic *determinatums* are also not numerous: طالب العلم “looking for knowledge” is changed into طالب “a student”.

3. RESULTS

The main difficulty in creating terms via translation is having to borrow foreign terms which represent compound nouns consisting of several meaningful morphemes while the prevailing word-building type of the Arabic language is inner inflexion based on a single root morpheme which has one meaning. That is why foreign compound terms are opposed to Arabic term combinations (Belkin 1975: 122).

Even the names of the majority of modern sciences represent a huge problem in the Arabic language since they can have several denotations after translation. For example, the word “biology” (from the *Greek* bio “life”+logos “teaching”), translated literally as علم الحياة “science about life”, is specified as علم الأحياء “science about living organisms”, which contradict the direct borrowing بيولوجيا; the term “physics” (*Greek* phisike “teaching about nature”) in Egypt was translated literally علم الطبيعة as “science about nature”, however in other Arabic countries it was substituted with the borrowing فيزيقا; the word “geology” (*Greek* geo “the Earth”) is now and then translated by the combination علم الأرض “science about nature” or specified as علم طبقات الأرض “science about the ground layers”, but جيولوجيا is used more frequently.



The examples of term combinations formed via calquing in the Arabic language are the following: **كلى صناعية**: “an artificial kidney”, **محرك احتراق داخلي**: “an inner combustion engine”.

While translating the Arabic terms one should bear in mind that some of them possess doublets. In this case, even international Greek-Latin or other terms may be translated into the Arabic language by different lexemes or lexeme combinations. For instance, the physical term “energy” had the form **طاقة** in Egypt, and **قدرة** in Syria. To convey the meaning of “power”, the word **قدرة** is used in Egypt alongside the **طاقة** which is used in Syria. The economic word “commodity” is represented in the same way by the **سلعة** and **بضاعة** respectively.

Specific interest in translation is caused by the Arabic terms formed via composition. This can be seen in the following examples:

“amphibian” – **برمائي**

“electromagnet” – **كهريطيس**

The characteristic feature of scientific discourse is neologisms. New concepts, which have appeared as the result of science technical revolution, require new words to denote them. The neologisms which appear in scientific works prove to be much more stable than the ones appearing in other styles (journalistic, colloquial, etc.). They either enter the holdings of commonly used lexis or used specifically in science. Below are the combinations that became terminological and frequently used in scientific discourse:

“production of electric power” – **توليد الكهرباء**

“an orbital satellite” – **القمرية المدارية**

Striving to abstraction and generalization of facts of reality leads to the use of special formulas, conventional symbols and signs instead of words.

It happens because symbols and conventional signs do not have a tendency to receive new meanings. The Arabic science technical texts deal with international symbols such as x, y, z .. A, B, C.. a, b, c.. π , etc.

Apart from that purely Arabic symbols are used:

الوقت – “س”, شدة تيار – “ت”, طول الملف – “ل”

زاوية الانحراف – “ح”, نصف قطر الملف – “نق”

“Language contact as a worldwide sociolinguistic phenomenon influences the change of any language. One of this contact results is lexical borrowing” (Fattakhova, Mingazova



2015: 302). Thus, scientific works in the Arabic language are characterized by a large number of borrowings which are international:

“X-rays” – أشعة رونتجين

“gram” – الغرام

As far as syntactical level is concerned, scientific works have a strict and logical layout. It determines the wide use of cause-and-effect linkage, prepositional phrases used in the syntactical functions of linkers. Here we can also see patterns created as the result of desemantization of such words as “نتيجة” “a result”, “انطلاق” “departure”, “سند، دعامة” “a pillar”:

“as the result” – نتيجة لـ

“basing on this” – انطلاقا من شيء

Clear logical interactions of different parts of utterances are as well expressed by participial phrases. Scientific texts do not have brevity as the main feature. On the contrary, proving scientific claims demands explanatory statements, which is achieved by different means such as participial phrases.

Scientific texts are characterized by the use of modal verbs and constructions. As a rule, they refer to the whole sentence and point to the degree of objectivity of the main information in the sentence. To such belong:

“it is probably that” – من الممكن أن

“it is clear that” – مفهوم أن

As soon as scientific description draws attention to the fact itself or a phenomenon, not on the doer of the action, there is a wide range of passive constructions in scientific works.

4. DISCUSSION

Thus, the biggest role in creating the Arabic terms at the present moment belongs to copying foreign terminological systems. The above-mentioned copying is realized in the following ways:

- 1) termination of specific meanings of archaic or currently existing lexis;
- 2) formation of new word terms according to the word-building models which exist in the language;
- 3) translation of terms and terminological combinations and their subsequent shortening through processes of ellipsis or word compounding;
- 4) direct borrowing of terms.



Arabic terminological system is characterized by the existence of terminological doublets (synonyms).

Compound foreign terms are translated into the Arabic language via word combinations.

The peculiar feature of the Arabic terminology is the wide use of neologisms.

A large amount of borrowings into the Arabic terminological system are international words.

Scientific texts are usually divided into paragraphs. Each paragraph represents a more or less finished statement in which the pivotal idea is pointed out and that which at the same time develops the ideas of the previous paragraphs.

5. CONCLUSION

Apparently, adequate translation of the Arabic scientific terms into other languages stipulates the knowledge of the main features of their formation the main role in which is currently played by foreign terminological systems, borrowed by the Arabic language.

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