

# Peculiarities of Linguistic Modelling of English and Georgian Scientific Terminology

*Tamar Kvitsiani  
Ivane Javakhishvili Tbilisi State University  
E-mail: tamunakviciani@yahoo.com*

## Abstract

In today's rapidly evolving scientific and technological landscape, the study of terminological issues has gained increasing significance. Terminology is a fundamental prerequisite for the development and effective functioning of scientific disciplines and professional domains. Inconsistent, ambiguous, or inadequately standardized terminology may impede progress within a given field. Therefore, greater attention should be paid to terminological work in Georgia.

As T. Cabré notes, scientific and technological development is predominantly concentrated in economically advanced countries, where the production of knowledge is most intensive. As a result, other, economically less powerful countries largely acquire scientific knowledge through these centres, which leads to extensive borrowing of technical and scientific vocabulary. Within terminology studies, this situation is often associated with asymmetrical knowledge transfer and linguistic dependency. Consequently, such countries are faced with the need to regulate terminological borrowing in order to avoid uncontrolled lexical influx that may weaken the structural integrity and functional stability of their languages (Cabre, 1992). Georgian linguists and subject-field experts note that terminological development in Georgia faces a number of challenges. A significant proportion of terms across various disciplines are borrowed, which is generally considered an undesirable tendency.

The importance of this issue prompted an in-depth investigation into term-formation methods in modern Georgian terminology, comparing them both with methods used in the twentieth century and with English term-formation patterns. This paper presents the study's findings.

**Keywords:** terminology; Georgian term-formation methods; term-formation methods in English; etymology; the influence of Russian

## 1 Introduction

In the context of ongoing scientific and technological advancement, the study of terminological issues is of particular importance. Numerous new concepts emerge on a daily basis,

which creates the need to designate them, that is, to assign names to them that comply with international standards as well as the specific linguistic norms of a given language (ISO 704:2022: 83–104). Consequently, the regulation of term-formation processes is crucial for the survival and proper development of any language.

Georgian linguists and field specialists note that greater attention should be paid to terminological work in the country. Many terms across various fields are mainly borrowed words, a tendency that is generally seen as undesirable and negative (Gogia 2023; Margalitadze 2019; Karosanidze 2012).

To examine this tendency, we conducted a quantitative study in 2022–2023 based on a dataset of 1,600 terms drawn from various subfields of biology. The primary aim was to determine the proportion of borrowed terminology in modern scientific domains, with genetics, immunology, and biotechnology selected as the focus areas. A total of 800 terms from these fields were examined, and the results showed that approximately 75–80% of them are loanwords. This finding was then compared to terminology from more traditional disciplines, reflecting the term formation patterns in the 20th century. For this purpose 800 terms from botany, zoology, and anatomy were selected. The analysis revealed a radically different tendency, as nearly 80% of the examined terms were found to be of Georgian origin, formed on the basis of Georgian language resources (Kvitsiani 2023).

The results of this study motivated an in-depth investigation of term-formation methods in Georgian terminology. The research was conducted in two stages. In the initial stage, term-formation methods in more traditional fields (botany, zoology, and anatomy) were examined. In the second stage, term-formation methods in fields that developed relatively later (immunology, biotechnology, and genetics) were analysed and compared with those used in the twentieth century. The study of term-formation methods also included a comparison with equivalent English and Russian terminology. English was included because modern Georgian terminology is largely influenced by the English language, while Russian was considered due to its strong impact on Georgian terminology in the twentieth century.

The results of the first stage of the research have been published in the electronic bilingual scholarly journal *Spekali* (Kvitsiani, 2024). The study revealed that the primary source of Georgian botanical, zoological, and anatomical terminology is the Georgian language itself, accounting for approximately 80% of the analysed terms. These findings further demonstrate that, in the greater part of the twentieth century, terminology was developed in accordance with Georgian linguistic norms, making extensive use of the resources of the Georgian language.

Georgian terminologists most frequently employed structural borrowing in the process of term formation. It has also been shown that, due to the political context of the country, twentieth-century Georgian terminology was significantly influenced by Russian, and many terms were created on the basis of Russian structural models. Nevertheless, this process ultimately resulted in transparent, easily understandable, and readily interpretable Georgian terms. In addition, Georgian terminologists actively drew on Latin models for structural borrowing. The study has also revealed that Georgian terminologists created new terms from common words through metaphorical extension, assigning them specialized terminological meanings. Word formation is another frequently used method. Direct borrowings

in these fields are relatively rare, accounting for approximately 20% of the analysed terms. The sources of these borrowings were primarily Russian and Latin.

The study of English terms from the fields of botany, zoology and anatomy showed the characteristic features of their modelling. For example, most of the one-word terms are formed from Latin and sometimes Greek roots. Latin and Greek borrowings express the feature which is one of the characteristics of the respective concept. Analytical terms, by contrast, are predominantly formed using English lexical resources. By English resources, we refer to words of Germanic origin, also internal creations in English, as well as words borrowed from French or other languages in earlier stages of the development of English that are now fully integrated into its lexicon. In this case, the term-formation process is likewise motivated by the inherent characteristics of the concept. In the process of term-formation Latin names of plants and animals are also used applying the method of structural borrowing (Kvitsiani, 2024).

## 2 Data and Methodology

The data for the second stage of the research were based on the dataset of 800 terms drawn from the abovementioned study (Kvitsiani, 2023), from which a random sample of 100 terms was selected, representing three subfields of biology: immunology, biotechnology, and genetics. To examine traditional Georgian term-formation methods, the study relied on the approaches and principles outlined in the monograph by the Georgian terminologist R. Ghambashidze, *Georgian Scientific Terminology and the Main Principles of its Compilation* (1986). To analyse the key characteristics of modern terminology, reference was made to international terminological standards, specifically ISO 704:2022, *Terminology Work – Principles and Methods*.

As noted above, the study employed a comparative approach involving three languages – Georgian, Russian, and English. In order to obtain a more in-depth understanding of English term-formation processes, we also applied the etymological method of analysis. The etymological origins of English terms were identified with the help of the *Oxford English Dictionary of Historical Principles* (OED) and the *Online Etymology Dictionary* available at the URL [etymonline.com](http://etymonline.com).

## 3 Tendencies in the Modelling of English and Georgian Terms: The Case of Immunology, Biotechnology, and Genetics

The randomly selected 100 terms from the domains of immunology, biotechnology and genetics were analyzed from the point of view of term-formation methods. The in-depth study of these terms has revealed the extent of the influence of the English language on Modern Georgian terminology. English terms are borrowed directly into Georgian or Georgian terms are loan translations of their English equivalents. There are cases when even the analytical terms are borrowed into Georgian which is a very negative tendency for modern Georgian terminology. Below are given some examples of analysed terms (1-15):

**(1) Affinity** – an English immunological term of the Latin origin.

The Georgian equivalent of this term is აპინობა / *apinoba*.

The Russian equivalent of this term is родство.

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As the comparison of these three terms shows, the English term is a word of the Latin origin. This word is polysemous in English. It is used in other domains and has migrated to the field of immunology at a later stage. The Georgian term is borrowed from English. The Russian term is formed from a Russian word, it is not a borrowing.

**(2) Anergy** – an English immunological term that means the absence of a normal immune response to a particular antigen. This English term is of the Greek origin (OED) and denotes one of the characteristics of the concept.

The Georgian equivalent of this term is ანერგია / *anergia*.

The Russian equivalent of this term is толерантность.

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The comparison of these three terms demonstrates that the English term is formed from an English word of the Greek origin. The Georgian term is borrowed from English. The Russian equivalent is not formed from English.

**(3) Antigenic shift** – an English immunological term. It is an analytical term consisting of the word of a German origin *antigen* and native English *shift*.

The Georgian equivalent of this term is ანტიგენური შიფტი / *ant'igenuri shipt'i*.

The Russian equivalent of this term is антигенный сдвиг.

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As the analysis of these three terms reveals, the English term is formed by the combination of English words, one of which is of the German origin. The Georgian term is borrowed from English; as for the Russian term, it is a loan translation, presumably from English.

**(4) Bivalent** – an English immunological term. Its components *bi-* and *valent* are of the Latin origin.

The Georgian equivalent of this term is ბივალენტური / *bivalent'uri*.

The Russian equivalent of this term is бивалент.

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As the comparison of these three terms shows, English term is formed from English elements of the Latin origin, whereas the corresponding Russian and Georgian terms are borrowed from English.

**(5) Cognate** – an English immunological term of the Latin origin.

The Georgian equivalent of this term is კოგნატური, მსგავსი / *k'ognat'uri, msgavsi*.

The Russian equivalent of the word is *похожий; сродный*.

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A comparison of these three terms shows that English term is formed from an English word of the Latin origin. It is a legal term, and has non-terminological meanings as well. In this case this legal term migrated into the domain of immunology. The Georgian equivalents of this term consist of both, a borrowing and a Georgian word. Russian equivalents are formed from Russian words.

**(6) Combining site** – an English immunological term. It is formed by the combination of words of the French origin *combine* and *site* (OED).

The Georgian equivalent of this term is *კომბინატორული საიტი / kombinatoruli saiti*.

The Russian equivalent of this term is *связывающий сайт; комбинаторный сайт*.

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Comparing these three terms demonstrates that English term is formed from English words of the French origin. The Georgian term is a borrowing, while the Russian equivalent terms are loan translations from English.

**(7) Complement** – an English immunological term, formed from an English word of the Latin origin.

The Georgian equivalent of this term is *კომპლემენტი / komplementi*.

The Russian equivalent of this term is *комплемент*.

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As can be seen from the comparison of these three terms, English term is based on an English word of the Latin origin. This word is used in different fields in the English language. Georgian and Russian equivalents are borrowed from English.

**(8) Constant domain** – an English immunological term, formed by the combination of *constant* and *domain*, words of the Latin origin.

The Georgian equivalent of this term is *კონსტანტური დომენი / konstanturi domeni*.

The Russian equivalent of this term is *константная область; С-домен*.

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As the analysis of these three terms demonstrates, English term is formed from English words of the Latin origin, that have several polysemic meanings including terminological. The Georgian analytical term is borrowed from English, whereas the Russian equivalents are calques.

**(9) Effector cell** – an English immunological term that consists of *effector* and *cell*, words of the Latin origin.

The Georgian equivalent of this term is *ეფექტორული უჯრედი / epekt'oruli ujredi*.

The Russian equivalent of this term is *клетка-эффлектор*.

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The analysis of these three terms shows that the English term is formed from English words of the Latin origin. As for the Georgian and the Russian equivalents, they are calques from English.

**(10) Follicular dendritic cell** – an English immunological term, that consists of the words *follicle*, *cell* (Latin origin) and *dendrite* (Greek origin).

The Georgian equivalent of this term is *ფოლიკულური დენდრიტული უჯრედი* / *polik'uluri dendrit'uli ujredi*.

The Russian equivalent of this term is *фолликулярная дендритная клетка*.

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As illustrated by the comparison of these three terms, English term is formed from English words of the Latin and Greek origins. Georgian and Russian equivalents are calques of the English term.

**(11) Germinal centre** – an English immunological term formed from words of the Latin origin *germinal* and *centre*.

Georgian equivalent of this term is *გერმინაციული ცენტრი* / *germinatsiuli tsent'ri*.

Russian equivalent of this term is *зародышевый центр*.

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The English analytical term is formed from words of the Latin origin. The Georgian equivalent is a borrowing, while the Russian term is a calque.

**(12) High endothelial venule** – an English immunological term that is formed from English words of Germanic (*high*), German (*endothelioma*) and Latin origin (*venule*).

The Georgian equivalent of this term is *მაღალი ენდოთელიალური ვენულა* / *maghali endotelialuri venula*.

The Russian equivalent of this term is *наружная эндотелиальная венула*.

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As can be seen from these terms, Georgian and Russian terms are only partly calques of the respective English term, as only the first components of this analytical term are replaced by Georgian and Russian words.

**(13) Homing** – an English immunological term formed from a native English word.

The Georgian equivalent of this term is *ჰომინგი* / *houmingi*.

The Russian equivalent of this term is *хоминг*.

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The English term is formed from a native English word. It is a polysemous word and has several terminological meanings. This term migrated to immunology from other domains. Georgian and Russian terms are borrowed from English.

**(14) Natural killer cell** – an English immunological term that consists of English words of French origin (*natural, cell*) and a native English word *kill*.

The Georgian equivalent of this term is ბუნებრივი კილერული/მკვლელი უჯრედი / *bunebrivi k'ileruli/mk'vleli ujredi*.

The Russian equivalents of this term are *нормальная клетка-киллер; натуральная клетка-киллер*.

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As the analysis of these three terms demonstrates, English term is formed from English words of native English and French origin, whereas Georgian and Russian equivalents are calques of the English term.

**(15) Southwestern blot** – an English biotechnological term that consists of native English words *south, western* and *blot*.

The Georgian equivalent of this term is საზერნ-ვესტერნ ბლოტინგი / *sazern-vest'ern blot'ingi*.

The Russian equivalent of this term is *саузерн блот анализ*.

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As the comparison of these three terms reveals, English term is formed from native English words. As for its Georgian and Russian equivalents, they are borrowings from English.

## 4 Discussion

The analysis of terms from the fields of immunology, biotechnology, and genetics revealed the significant influence of English on contemporary Georgian terminology. A comparison of the Georgian and Russian equivalents of English terms showed that Georgian terms are formed under the influence of English rather than Russian. They are either calques of English terms or direct borrowings from English.

The study of contemporary English term-formation patterns has revealed that one-word terms are often polysemous and may possess multiple terminological meanings. Most one-word terms in English arise either through the migration of common words into specialised terminology or through the transfer of terms from one domain to another. This indicates that terminologists frequently employ metaphorical extension and semantic transfer in the process of term formation. In the case of one-word terms, words of Latin and Greek origin are particularly common. The designations of concepts typically reflect one of the characteristics of the concept concerned.

Most terms are multi-word (analytical) terms. In English, they are formed from lexical units of Greek, Latin, French, and occasionally German or other origin. Having been borrowed at

earlier stages of the language's development, these words have become an integral part of the English lexicon. As with one-word terms, the formation of analytical terms is generally based on the selection of a characteristic feature of the concept denoted.

The analysis of contemporary English terms revealed a high degree of transparency in the terminology of these fields. This transparency results from the use of common words and terms borrowed from other domains in the term-formation process. Multi-word terms are likewise transparent, as they are formed from lexical units that either already exist in the language or were borrowed from other languages at earlier stages of the development of English. A contrasting situation can be observed in Georgian, where English terms are frequently introduced through direct borrowing. In some cases, even multi-word terms are transliterated, and their components are not replaced by Georgian equivalents. As a result, many contemporary Georgian terms are neither transparent nor semantically motivated.

The analysis of the terms from the fields of immunology, biotechnology and genetics revealed that English language has significant influence not only on Georgian, but on Russian as well. The study of the terms from these fields proved that most of the Russian terms are formed according to the patterns of English terms. In most cases Russian terms are either transliterated from English or terminologists apply the method of structural borrowing to form terms. It can be said that some Georgian terms of these fields may be introduced into Georgian not directly from English, but from Russian and modern Georgian terminology may still be under the Russian influence.

## 5 Conclusion and Recommendations

The study has demonstrated that traditional (20th-century) and modern term-formation methods in Georgian differ significantly. Traditional Georgian terminology, exemplified by terms from the fields of botany, anatomy, and zoology, is predominantly based on the resources of the Georgian language and follows its grammatical and word-formation rules. As a result, the terminology is generally transparent and easily comprehensible. The research has also shown that, in the 20th century, Georgian terminologists employed a range of methods in term creation, including structural borrowing, semantic borrowing, metaphorical extension, and word-formation processes. Overall, the term-formation process was strongly influenced by the Russian language, and the majority of Georgian terms were formed by the analogy of respective Russian terms.

In contrast, modern Georgian terminology, examined on the basis of terms from the fields of immunology, biotechnology, and genetics, is strongly influenced by the English language and predominantly consists of direct borrowings and calques from English. There is a tendency to borrow even multi-word terms that are neither concise nor transparent or easily comprehensible. In many cases, the norms of the Georgian language are not consistently observed. Unlike this, English terminology is generally clear and transparent, as it is based either on common lexical items that have been transferred into specialised usage or on terms that migrate from one domain to another. Thus, English actively exploits existing linguistic resources in the formation of contemporary terminology.

Proceeding from the results of our research we came up with some recommendations for terminology work in Georgia:

1. If an English one-word term is created through the metaphorical extension of a common word and its transfer into specialised terminology, the method of semantic borrowing can be applied to create a Georgian equivalent by analogy with the English term. The history of Georgian terminology demonstrates that Georgian terminologists have skillfully transferred words from the general vocabulary into specialised terminological use. They have also employed the method of semantic borrowing from Russian. We believe that these approaches should be preferred to direct borrowing in the process of term formation, particularly in the case of terms based on common words. The application of this method may lead to polysemy; however, the polysemy of terms is now recognised as one of the characteristic features of modern terminology and is acknowledged in international terminological standards.
2. In the process of introducing multi-word terms into Georgian, the method of structural borrowing should be applied. This approach was employed by Georgian terminologists and translators in the Middle Ages, as well as in the 20th century and has also been widely used in various European languages, including Russian. The transliteration of analytical terms should be regarded as unacceptable. According to our study, the number of analytical terms has increased in modern terminology. The application of structural borrowing would enrich modern Georgian terminology with transparent and readily comprehensible terms.
3. Georgian word-formation means can be successfully applied in the formation of Georgian terminology.
4. Developing a terminological policy and regulating terminological work are priorities in many countries, where language and terminological policies are often governed by legislation. This should also become a priority in Georgia. The process of terminology creation should involve government agencies, terminologists, linguists, and subject-field specialists working together to coordinate and oversee terminological work, which is currently rather fragmented. When introducing terms into Georgian, priority should be given to transparency, motivation, and comprehensibility, ensuring that terms are easily understood by specialists, students, and the wider Georgian-speaking public.

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