



ERROR ANALYSIS OF SCIENTIFIC PAPERS WRITTEN BY NON-NATIVE SPEAKERS OF ENGLISH

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Abstract. The paper presents linguistic error analysis of articles written by non-native speakers of English which were published in the journal 'Transport' in 2003 – 2004. The errors were identified, classified and analysed from various perspectives. The main causes of language misuse were also identified and explained within the framework of the theory of linguistic relativity and laws of interference of the native language of the learners. The analysis is aimed at building competence of technical writers in the English language used in scientific papers. The results obtained in the investigation allowed the authors to provide some recommendations to technical writers as to improving the proficiency in scientific English.

Keywords: error analysis, scientific papers, non-native speakers of English, competence and proficiency in technical writing.

1. Introduction

Since Lithuania regained independence, it has been pursuing the policy of integration into the international community. To achieve this goal, good knowledge of foreign languages is a must. It particularly applies to the English language as a major means of communication among nations often referred to as *lingua franca* (a common language). Lithuania possesses human resources of a relatively high professional level. Nearly every higher school, which are quite a few in this country, has some research center or laboratory and publishes journals in English highlighting their achievements in various fields of science and technology. This is of paramount importance if we want to be heard in the world. Vilnius Gediminas Technical University is among the leaders in this field, maintaining close contacts with foreign partners and publishing scientific and technical journals in English in such areas as economics, transport, architecture, civil engineering, etc. Some journals are mixed, containing articles written both in Lithuanian and English (for example, a journal on social, philosophical and linguistic problems).

However, it should be admitted that the level of the English language in these articles is not high. Therefore, the analysis of linguistic errors in these publications is needed which could help to improve the proficiency of the authors in technical English.

The main goal of the present paper is error analysis of the English language used in the articles published in the journal 'Transport' in 2003 – 2004. The analysis is aimed at identifying the most common mistakes and their sources as well as classifying the errors encountered and providing some recommendations helping to avoid them.

As far as we know, this is the first attempt to analyse scientific and technical articles from this perspective, but we hope that it will be useful for all professionals reading and writing in English and will help them to increase the awareness in differences in meaning and appropriateness and critical ability with regard to English language errors.

2. Theoretical background

It is common knowledge that only very few authors are able to achieve a level of proficiency that approximates the native or native-like level. The marginalising of non-native speakers contributions to academic journals by means of insisting on native speakers norms of academic English is based not on academic expertise but purely on linguistic criteria. A Chinese academic takes up the issue by asking in an article in the international journal *English Today* why she, who has never entered a native English-speaking country, had to adjust her China English, in

order that her article be accepted for publication [1]. Today academic journals are custodians of the correct English, essentially Standard British or American English.

Technical writing in international scientific journals should match readers' expectations that can vary from discipline to discipline, and across cultures they differ even further. Readers should reach the same conclusion, and also they should not have to spend much time figuring out inappropriate expressions which inhibit understanding.

Lack of clarity is one of the most frequent criticisms levelled at English texts produced by non-native speakers. Both native and non-native speakers of English produce flawed essays. Both are using grammar and facts to select and organize experience, and both make mistakes. The errors range from sentence level problems to topic development to essay structure. But, as with grammar and syntax, the nature of problems differs. Non-native speakers writing in English tend to make specific errors that are uncommon among native speakers of English.

Errors are considered to be evidence of the learner's strategy as he or she builds competence in the target language by regarding the rules of it. Determination and identification of errors is as important as their classification. Besides, highlighting of global errors, those which inhibit understanding, must be of primary importance in error analysis.

In the present paper, error analysis is performed within the framework of the theories of the native language interference and linguistic relativity, which can explain why certain types of errors are made. This, in turn, can help to avoid them. The interference of the native language implies that it prevents the speakers of a particular language from using a foreign language correctly by transferring the rules and standards of their native language to that foreign language. This inevitably leads to mistakes because every language is a system governed by its own laws. The theory of linguistic relativity, in its turn, can explain why the interference of the native language takes place. This story deals with the relationships between thought, language and reality showing their mutual dependence and influence. It states that languages differently segment the reality because the speakers of particular languages often chose different characteristics of multifaceted objects in giving names to them [2–4]. Therefore, nationally-specific and international patterns of nomination exist, with the former presenting the main difficulties to speakers of other languages, causing mistakes and misunderstanding. The material for investigation was taken from scientific papers found in the journal 'Transport', published by Vilnius Gediminas Technical University and Lithuanian Academy of Sciences.

3. Error analysis

3.1. Grammatical errors

Constance Weaver suggests that we limit our teaching of grammar to only those features that will be most valuable in helping writers eliminate errors and increase the effectiveness of their sentence [5]. Of course, the effectiveness of sentence is of primary importance. First, writers should consider grammar-related problems that inhibit understanding and clarity.

One hundred and ninety eight sentence level errors have been identified in 165 sentences of 58 research articles on transport, published in the journal 'Transport' (Vol XVIII, No 1–2, 2003; Vol XIX, No XIX, No 1–4, 6, 2004) [6–13]. The analysed scientific papers were written by the authors from Lithuania, Latvia, Poland, China, India and Nigeria. In this paper, the errors have been grouped according to error type, and the examples with frequent and typical errors have been chosen for the analysis.

Word Form

Word form is often referred to as word class. Sometimes spelling mistakes interfere with the meaning of the word. Let's consider the following word form errors identified in the research articles on transport (of the different underlined errors only the considered error type corrections are given in brackets):

- The transport sector plays a central role in Lithuanian's modern national economy (No 1, 2004, p. 14).
(= ...the Lithuanian ...economy).
- The achieved results could be explained by the conditional less level of emissions of NOx (No 6, 2004, p. 258).
(= ...a... lower level...).
- (...) when the car losses any contact with... (No 1, 2004, p. 20).
(= ...the car loses...contact).
- As the Swedish practise shows... (No 6, 2004, p. 253).
(= ...practice...).
- In this paper, motor vehicle hydraulic break system consisting of two contours is considered (No 1, 2004, p. 45)
(= ...brake system...).

Sometimes, a slip in punctuation may cause a word form error:

- In Australian, city of Victoria (No 1, 2004, p. 18).
(= In Australia, ...).

Spelling errors can deviate the form of the word:

- Review of the Monograph... (No 2, 2003, the back cover)
(=... the Monograph...).

Verb Tense and Verb Form

The inappropriate shift from one time frame to another is a frequent mistake with non-native speakers of English:

- Therefore, the locomotives being investigated ran along the tracks with the curvative radius common to Lithuanian railroads (No 1, 2004, p. 33).
(=...the locomotives ...run...).

The misuse of verb tenses and verb forms is typical for Lithuanian writers:

- The clutches used up to now not fully satisfy the vibration protection requirements (No 2, 2004, p. 69).
(=...haven't fully satisfied...).
- Since 1995 the amount of passengers using country railway services (...) is steadily decreasing... (No 2, 2003, p. 96).
(=...has been steadily decreasing...).

The verbs 'let' and 'make' have the structure verb+object+infinitive without 'to'. Consider the following example:

- Solving the problem will let us to optimize the schedules of vehicle operation (No 6, 2004, p. 242).
(=...will let us optimize...).

The following sentence is quite clumsy, but the focus is on 'to make' which cannot follow 'possibility':

- This gives the possibility to make computer search ... (No 1, 2004, p. 9).
(=...the possibility of making...).
- It is suggested to pay attention to the proposed strategic directions (No 1, 2004, p. 9).
(=It is suggested that attention (should) be paid...).

Subject Verb Agreement

In the following example the subject and the verb do not agree in number:

- The main components of INSEL (Instrumentation selection) consists of the inference engine (No 4, 2004, p. 174).
(=The...components...consist...).
- The intensity of wearing of the locomotive wheel tyres and their flanges in particular depend on the extent of curvature (No 1, 2004, p. 33).
(=The intensity...depends)

Conditionals

Most of the misuses identified are related to verb forms in subordinate clauses:

- If a car driver will hit the standing car with a higher speed than 50 km/h there is no possibility for a driver to survive (No 1, 2004, p. 19).
(=If a car driver hits...).

In the example provided, 'will hit' implies a will (an intention) of a car driver to hit 'the standing car' (= a standing car). The same applies to the following sentence:

- If a car driver will hit the driver or passengers doors... (No 1, 2004, p. 19).
(=If a car driver hits...).

Connectives

To consider the logical relationship you want to establish, you need the correct connector. The following examples imply to the interference coming from the Lithuanian language:

- It is important to understand and make explicit these influences so we know clearly hypotheses... (No 3, 2004, p. 104).
(=...so that we might know...).
- As shown in Fig1 (d), a wall press type denotes the robot with flexible mechanism for pressing the wall whatever means that it has an advantage of climbing vertical pipelines (No 1, 2004, p. 37).
(=...that means it has an advantage...)

Articles

Although rarely a problem with native speakers, non-natives frequently have problems with the articles, and the problems are very glaring to native speakers, so it is worth getting these right. The provided examples account but for a small part of the identified errors:

- higher speed,... harder consequences... (No 1, 2004, p. 19).
(=...the higher the speed, the harder the consequences...).

The definite article is used in double comparatives.

- The large amount of data is necessary (No 6, 2004, p. 259).
(=A large amount...).

When a certain quantity is modified by prepositional phrases, the indefinite article 'a/an' is used.

- Such tendency is observed not only for aged cars (No 4, 2004, p. 179).
(=Such a tendency...)
We use 'a/an' after 'such' with singular countable nouns.
- At the Vilnius Gediminas Technical University... (No 1, 2004, p. 24).
(=At Vilnius Gediminas Technical University...)
We use the zero article with universities, colleges and schools beginning with a proper noun.
- ...at the Klaipėda port... (No 2, 204, p. 78)
(...at Klaipėda port...)
The zero article is used with names of public places beginning with a proper noun.
- ...since 1992 till 1998 the number of injured as well as killed rose sharply (No 4, 2004, p. 184).
The definite article is used with some adjectives without nouns. The meaning is always plural.

Sentence Structure

The term is used for errors pertaining to sentence structure, for example, if a sentence is too long and needs to be reorganised. Syntax and verbosity form the most formidable barriers to effective communication. Some authors have simply make their sentences more readable and direct and cut them to a third of their original length:

- With reference to the publications of the authors as well as having evaluated the way the indirect forecasting is applied in passenger's transportations when analyzing the need and origin of communication, the forecasting algorithm will be presented as well as the formulation of the task of forecast need for good carriage (No 2, 2004, p. 82).
- The evaluation of the effectiveness of complex application of programmes of mathematical modelling using the limited amount of experimental data of operational and working parameters of medium speed diesel engines (No 6, 2004, p. 52).
In the latter sentence the recurrent of-phrases abuse the language. Besides, it is recommended that nonspecialised terms that are clear and unambiguous in their meaning be used whenever possible in place of less familiar ones. The same holds due to the following sentence:
- There is a performed approbation of the interapplication of computer programs with a different level of elaboration for the optimization of the main indexes of medium speed diesel engines... (No 6, 2004, p. 261).

Word Order

Word by word translation from Lithuanian into English may alter the meaning of the sentence:

- Consequently, the covered area the extinguishing water enlarges as well as the water efficiency (No 1, 2004, p. 40).
(=Consequently, the extinguishing water enlarges the covered area as well as water efficiency).
- Accidents occur every 15 seconds, in which people suffer (No 1, 2004, p. 41).
(=Accidents in which people suffer occur every 15 seconds).

Vocabulary

- ...the steep ascend on the graph takes place... (No 1, 2004, p. 27).
(=...a sharp rise is shown on the graph).
- It was assigned that oiled and not oiled wheel tyres would operate under the same conditions... (No 1, 2004, p. 33).
(=It was determined ...).
Native language interference frequently causes sentence level vocabulary type errors.

Punctuation

Equations frequently present a challenge to the technical writer. Equations can be considered as a part of the sentence where they are used. Let us consider the following examples:

- ...Fig 4 shows the diagram representing the effective distance between two road bumps.
Where:
 $v=f\lambda$... (No 3, 2004, p. 134).
(=Fig 4 shows the diagram representing the effective distance between two road bumps, where $v=f\lambda$...).
 - The colon is frequently misused in technical writing. An incorrect usage would be to put the colon after is/are with 'as follows' deleted:
 - The number of hauls made by j type trucks is:
 $nej=...$ (No 1, 2003, p. 11).
(=The number of the trucks is as follows:
 $nej=...$).
- The analysis of the classified errors is expected to help the writers identify and eliminate these errors. The analysis of grammar errors in use should reinforce the importance of studying or revising grammar.

One cannot really expect the contributors to the

journal of Transport to eradicate all errors related to grammar. The error analysis is directed towards the reduction of global and frequent errors.

Sometimes the source of grammar problems is not, for most of us, a matter of not knowing the rules. The source of some grammatical mistakes is simply not seeing them in your writing. Anyway, the errors discussed in this article are not accidental. Each type of errors, except for the mistakes with the article, are characteristic of some of the contributors to the considered issues of the technical journal. The identified sentence level mistakes with the passive and the number, as well as non-idiomatic misuses, have been made by individual authors. Since the latter mistakes account for a small part of the identified misuses, they have not been highlighted in the article.

3.2. Logical and conceptual errors

We may also distinguish logical and conceptual errors. Logical errors mean that in some sentences logical rules are violated and they actually have no sense. Consider the following examples: *The position of the tube variation unit can be switched* (it is hardly possible to switch a position); *variety of application* (= *variety of applications* because variety cannot refer to only one thing); *after research* (= *when research is completed*); *equipment which performs the functions of the fluid flow* (it is hardly possible to imagine such a situation); *the aspects of possibility to apply alternative fuel injective systems* (= *feasibility study of...*); *the body of equipment* (the body may refer only to a particular piece of equipment), etc.

Conceptual errors are associated with differences in expressing the reality by different languages. Speakers of a particular language are influenced by patterns of expression used in this language and often unconsciously transfer them to a foreign language. This is mainly word-for-word translation which causes mistakes and misunderstanding.

Consider these examples: *ground requirements* (= *basic or main requirements*); *large wear* (= *heavy wear*); *positive sides* (= *advantages*); *addition of force* (= *application of force*); *moving through the longitudinal axis of the tube* (perhaps, *moving along the tube*); *to provide the sureness, to get sure* (= *to make sure*), etc.

It is interesting to note that even English loan-words are used differently and acquire a specific meaning in the language that adopted them. When used in this new meaning in English, they often cause misunderstanding. Let us consider some examples: *trasa* is translated as *trace*, though in English this word actually means *a mark, object or other indication of something*; *to double* is used in the meaning of creating something identical to other thing (as is typical of a Lithuanian word *dubliuoti*) though in English it means

to become twice as much or as many. These examples demonstrate the so-called ‘pressure of the system’ when a particular language (as a system) alters the meaning of a loan-word to a smaller or larger extent. Such loan-words are referred to as ‘false friends’ of translator because they often cause grave mistakes leading to misunderstanding. Therefore, they deserve special attention and analysis.

4. Conclusions and recommendations

Linguistic analysis of papers written by non-native speakers of English has shown that a general level of technical writers in English is not high. Quite a few mistakes of various kinds have been found, analysed and classified. Their sources have been identified. The main two sources of errors are poor knowledge of English grammar and the specific features of scientific and technical language as well as unawareness of the fact that different languages segment the reality in different ways, using different words and expression in naming the same ‘pieces of reality’. The interference of the native language is very strong. More often than not, the language reminds of a lingua franca (mostly ‘Lithuanian English’) rather than the English language used by the native speakers.

The analysis allowed us to draw the following conclusions:

1. In general, in the papers analysed, sentences are often too long, with the order of words violated and the main ideas vaguely expressed. Therefore, it may be stated that the main disadvantage is the lack of clarity, concision and precision.

2. Sentences often reflect word-for-word translation from Lithuanian or other language which shows that the authors are hardly aware of the specific ways of expressing the reality by various languages. Hence, the mistakes at all levels: in a word, a sentence, a paragraph and the text in general.

3. Logical and conceptual errors show that special attention should be paid to these aspects. Therefore, before writing a sentence, the idea should be clearly formulated taking into account the relative nature of languages.

The following suggestions as to increasing the proficiency in technical writing may be provided:

1. Revise your English grammar (for this purpose, see, for example, [14]).

2. Get acquainted with the main stylistic peculiarities of technical and scientific writing (for this purpose, see [15, 16]).

3. Avoid word-for-word translation, keeping in mind the main principles of the theory of linguistic relativity which state that each language segments the reality in its own peculiar way. Therefore, the same

objects of reality and the whole situation may be expressed by different words and collocations. To avoid the interference of the native language, always ask yourself a simple question: ‘How do they put it in English?’ Then, look up the dictionaries providing contextual examples [17, 18], or access electronic data. In particular, Bank of English providing lots of collocations (phrases) may be recommended.

4. Make notes when reading English scientific papers and write down useful English phrases.

It should be noted that learning a foreign language, and the scientific language in particular, is a painstaking and complicated process requiring patience and rigorous efforts from the learners. It should also be clear that even good skills in conversational English cannot help much in scientific writing because these are completely different activities based on the use of specific grammatical, lexical and syntactic models.

English is a foreign language for all of us, therefore, one can hardly expect that we could write as the native speakers. However, an article can be written in the language that is acceptable for it to be published not only in a local but in a prestigious international journal as well, if technical writers follow the guidelines provided.

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