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Scientific Language – A Comparative Analysis of English, German and Russian

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Abstract

This essay for the inaugural issue of *Technology and Language* considers the development of scientific language in engineering. This development is influenced mainly by developments in industry and, in general, in society. With the help of some examples it is discussed how precise are English, German and Russian with respect to some expressions in the field of mechanics and engineering in general. The author is not a linguist and the given conclusions are personal impressions and not based in science. On the other hand, maybe the presented examples stimulate further research concerning the development and accuracy of scientific terms. The focus here is on three languages: English, German, and Russian. Surely, however, there are more examples, also with respect to other languages.

Keywords: Scientific language; Engineering; Mechanics; English; German; Russian

Аннотация

В этом эссе для первого выпуска журнала *“Технологии в инфосфере” (“Technology and Language”)* рассматривается развитие научного языка в инженерии. На это развитие в основном влияют изменения в промышленности и, в целом, в обществе. С помощью некоторых примеров обсуждается, насколько точны английский, немецкий и русский языки по отношению к некоторым выражениям в области механики и инженерии в целом. Автор не является лингвистом, и данные выводы являются личными впечатлениями и не основаны на научных данных. С другой стороны, представленные примеры, возможно, послужат стимулом для дальнейших исследований, касающихся точности научных терминов. Основное внимание здесь уделяется трем языкам: английскому, немецкому и русскому. Конечно, есть и другие примеры, в том числе и в отношении не представленных в работе языков.

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INTRODUCTION

The development of the technical language is significantly influenced by industrial development, but also by other factors. This can be shown by various examples from different branches for each language. The present author spent his scientific life mainly with three languages: English, German, and Russian. He was born in Germany that means German is his native language. He was a student from 1974 up to 1980 at the Leningrad Polytechnic (now Peter the Great St. Petersburg Polytechnic University) and during this period fully educated in Russian only and in that time knowing only Russian technical and scientific language. Coming back to Germany it was necessary to improve his German. He started a second professional carrier as a translator. After 1990, the scientific language of what used to be East Germany (GDR) also became English. Now a professor of mechanical engineering, he was from this time on interested in the different possibilities to express similar statements in these three languages, considering that English is the language of the majority of scientific papers, monographs, etc. However, this fact does not mean that English is more precise. In addition, from his student's time it was obvious that the German language had a great influence before World War II. For example, several of his elder academic teachers spoke German fluently. Finally, yet importantly, comparing English, German, and Russian one can state that Russian has far more words.

EXAMPLE 1: SHIPS AND SHIPBUILDING

The author was surprised and deeply impressed when he completed his Russian language studies that there are so many German or German sounding words in Russian. Later he understood the historical background. When Peter the Great was young and the Russian Empire was a not very developed country, the tsar travelled through different parts of the Russian Empire. He understood that for the further development of the country it was necessary among other things to organize the Russian Navy and to gain more maritime outlets. Regarding the first item, the need for shipbuilding was obvious. However, the knowledge on this topic in Russia was very poor. So Peter the Great traveled "incognito" to Western Europe on an 18-month journey with a large Russian delegation ("Grand Embassy"). The tour was connected with visits to Riga, Königsberg, Brandenburg, the Netherlands, England, Austria, Venice, and the Pope. While visiting the Netherlands, he studied shipbuilding in Zaandam and Amsterdam. His visit to German speaking parts of Europe and the Netherlands had a great influence on the Russian language. In this sense, we have now the Russian word "верфь" from the original Dutch word "werf" and most of the elements of sailing ships have Russian names based on the Dutch ones ("мачта" – mast, "рей" – ra, etc.). This example shows how great can be the influence from other languages on the development of a society.

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EXAMPLE 2: MECHANICS

For a long time, mechanics was a field of application for mathematicians. For example, the differential or integral calculus had a great influence on modeling and simulation of mechanical problems. Considering this, it is not surprising that several mathematicians contributed a lot to mechanics. So, for instance, Claude Louis Marie Henri Navier (1785-1836), who was a mathematician and an engineer, formulated the general theory of elasticity in a mathematically usable form (1821). The basics of mathematics are equations; there was no great influence on the language. Only some examples show that some terms from one language are used in another language as well: “ansatz” (German “Ansatz”) is used also in English scientific papers and books, the German “Eigenwert” is translated to English as “eigenvalue,” which is a mixture of German and English.

EXAMPLE 3: UNPRECISE TERMS IN MECHANICS

The basic terms in mechanics can be expressed in any language without difficulties. However, how precise are these terms in English, German or Russian? The English word “strain” is in German “Dehnung” and in Russian “удлинение.” As mentioned in Truesdell (1975) the translation of “strain” into Russian was connected with some difficulties. The editors of the translation (both were professors of the Leningrad Polytechnic Institute/Peter the Great St. Petersburg Polytechnic University) underlined in their foreword that there were some difficulties with the terminology. As an example, they mentioned that Truesdell used two terms “deformation” and “strain,” the last one in the descriptive meaning. The Russian translation for both was “деформация,” but in the case of the exact meaning “мера деформации” (in English “strain measure”) was used. To add to the confusion, the German expressions are “Deformation” or “Verformung” or “Verzerrung” and “Deformationsmaß” or “Verzerrungsmaß.” It is obvious that in this case any translator must have not only knowledge of the language, but also a deep understanding of the mechanics of continua. Note that there is another story with respect to the translation of the book by Truesdell: the Russian translation was published in 1975, but the original English book (Truesdell, 1977) in 1977 only.

EXAMPLE 4: MORE GENERAL TERMS IN MECHANICS

The next example is again from mechanics. Among the principles in mechanics we have the “Prinzip der virtuellen Verrückungen.” The English translation is “principle of virtual displacements” and the Russian “Принцип виртуальных перемещений”. If we are now looking for translations back to German, we get “Prinzip der virtuellen Verschiebung.” The problem is the meaning of the old German term “Verrückung”: in the strict sense, we have the change of placement by displacement; nevertheless, in German this can be extended to rotations.

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EXAMPLE 5: ON THE USE OF ENGLISH

Probably, English is the most used scientific language. If we are looking at some scientific branches, for example, informatics and computer sciences, we are using the English expressions also in German and in Russian. The English word “display” for the computer monitor is in German also “Display” (only with a Capital letter) and in Russian “дисплей” (same word, but Cyrillic transliteration). In the past there were other words in German or Russian, but people are using mostly the original English term. This is allowed and everybody understands the meaning, and maybe the communication is easier. However, we should be careful with the use of foreign terms in other languages. Similar to the so-called false friends, mistakes are possible: in German we like to use “Handy” for cellular phones. In Great Britain or USA the meaning “handy” is different, and they use “mobile” (GB) and “cellphone” (USA).

CONCLUDING REMARKS

Sometime the development of the scientific languages is influenced by the political situation. Let’s have a look at Timoshenko (1963, 1968, 1993, 2006). His Russian autobiography was first published in Paris in 1963. He had emigrated in 1919 and was the reason for some conflicts with the Soviet Union. In the book he presents very well the influence of German engineering education on Russia and later on the USA. The most remarkable element of this educational system was the combination of theoretical studies combined with lab elements. When he first came to Germany, he studied the experiences of such type of education and reorganized the Russian engineering education. He established by himself a testing machine for the strength of materials lab at the St. Petersburg Polytechnic which was used up to the 1970s when the author visited the lab. However, the strong impact on the educational system had no such influence on the scientific language as it did in the time of Peter the Great. The reason is not known – maybe the Russian engineering language was already well established, maybe there were political reasons (with the beginning of World War I, German was no longer accepted in the Russian Empire and St. Petersburg was renamed, as indeed during the Soviet time all foreign languages did not have a high reputation).

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