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*Kharlamova Tetiana*

*Senior lecturer*

*(National Aviation University, Ukraine)*

***The role of Technical English in Aviation Maintenance***

*The paper deals with results of a study that tested the Aviation (Technical) English as a restricted language in Aviation Maintenance. The paper reports the effect of simplified Technical English on the quality and ease of understanding for non-native English speakers.*

The role of general and Aviation (Technical) English in aviation industry has been discussed during recent years enough intensively. The primary objective of technical English is the disposal of linguistic barriers in a continuous attempt for the correct understanding of the instructions by the engineers, operators as well as improvement of flight safety and reliability.

The required level of in-service reliability and functionability are the priority of the modern aviation society that needs the advanced scientific and technological development. Thousands of operational, maintenance and support personnel all over the world are involved into in-service reliability and functionability of the aircraft on daily basis.

Thus, the use of a controlled or restricted subset of English for creating documentation and communicating is becoming more common in aviation industry as airlines attempt to improve the quality of manuals and technical documentation, especially those that need to be understood and read by non-native speakers of English.

Moreover, the designers and maintenance engineers of the aircrafts communicate with operators via technical manuals and other documentation. Operational and maintenance manuals are generated by manufactures that understand the science and technology embedded in their machines very well. However, operators and maintainers, who are neither scientists nor engineers, have to understand information that the aviation community is trying to communicate to them. This process was less challenging in the time of the Wright brothers when the associated documentation consisted of several pages, but the corresponding technical documentation in the current, web-oriented “Interactive Electronic Technical Publications” represents a real challenge [1].

So, the problem of communication holds for the communication among members of the crew in the cockpit, operators, designers, maintenance engineers, pilots and air traffic controllers. Among the languages used as the means of communication in aviation, English plays the dominant role. A substantial share of flights are and have been set within a national context where English is the official language; English serves most often as a lingua franca among the members of an international cockpit crew; a semi-artificial sublanguage based on English serves as the standard means of verbal communication between designers, operators, maintainer, pilots and air traffic controllers both in English-speaking countries and where international airports are involved. This suggests a significant relevance of the linguistic study of English as well as of communication conducted in English for safety issues in aviation. Surprisingly, however, there has been comparatively little work done by linguists – in the sense that includes linguistic pragmatists – or in collaboration with linguists in this area. As pointed out by Sexton & Helmreich: "Cockpit communication is a rich area of study for language investigators, and it has been relatively under researched given the critical role it plays in flight safety"[2].

Also, in order to communicate efficiently it worth focusing on the initial role of phraseology in case of both standard and non-standard situations. Phraseology is considered to be a “set of expressions used by a particular person or group”. Typically, this term is used when the grammatical structure is simpler than in full natural language. In contrast to sublanguages and fragments of languages, a phraseology is not a selection of sentences but a selection of phrases. Phraseologies can be natural or constructed, and in the latter case they are usually considered controlled natural language. Controlled vocabularies are standardized collections of names and expressions, including “lists of controlled terms, synonym rings, taxonomies, and thesauri”(ANSI/NISO 2005). Mostly, controlled vocabularies target a speciﬁc, narrow domain. In contrast to controlled natural language, they do not deal with grammatical issues, that is, how to combine the terms to write complete sentences. Many controlled natural language approaches, especially domain-speciﬁc ones, include controlled vocabularies [3].

So, it’s logically to conclude, that the maintenance engineers should be trained to:

* have a proper pronunciation
* use **grammar** more **accurately**
* develop a **wider** **vocabulary**
* **understand different accent**s, phrasal verbs, idioms and slang
* clearly report and handle unexpected situations
* give effective **presentations** about technical subject matter
* write accurate reports about malfunctions and unexpected events
* **understand** English speakers with **unusual accents**
* **interact** and **respond** to questions correctly
* **paraphrase** in case when other people don't recognize their vocabulary or pronunciation

However, to simplify English in use it was created a controlled natural language that is a subset of a natural language using a restricted set of grammar rules and a restricted vocabulary. A number of controlled natural language has been proposed and developed for a common goal: to reduce or eliminate the ambiguity and complexity of a natural language, and thus to improve readability and interpretation of the text for humans or machines [4].

Restricted subsets of English are also being applied to documents that need to be interpreted either by humans or computers. While the claims that using a restricted language makes documents more comprehensible and translatable are reasonable, empirical support is lacking.

In an attempt to provide empirical evidence as to whether, how, and to what degree a restricted language such as simplified Technical English can improve the comprehensibility and translatability of technical documentation, researches from Boeing and the University of Washington conducted a two-part empirical study on simplified English, which is writing standard currently used at Boeing for maintenance manuals.

Besides of mentioned above, there are several varieties of international language in existence, of most prominently the one recommended by the International Civil Aviation Organization and the one prescribed by the US Federal Aviation Administration [5]. The study of Aviation English and its use clearly belongs in the domain of research into languages for specific purposes and English for specific purposes. And some linguists with interests in this domain have indeed been concerned with it [6]. On the whole, however, as with the study of language in aviation in general, Aviation English has only played a very modest role in languages for specific purposes and English for specific purposes research. This is also reflected by the fact that there is not a single reference to Aviation English in the subject index for the more than 2500 pages of the two volumes of the international Fachsprachen/Languages for special purposes handbook [7].

But, in fact, the international language of the aviation industry, and all technical documentation is English, but for 80 % of operational, maintenance and support personnel in the aviation industry English is not the native language. Consequently, the problem arises daily when in-service personnel, the majority of whom have a limited knowledge of either general or Aviation (Technical) English, are trained to make use of the relevant technical documentation and there are endless opportunities for misinterpretation. Like other languages used around the world, many English words, phrases, and expressions have several meanings, which can be very confusing and potentially dangerous.

There are differences between general and Aviation (technical) English. The following sentence has been found in one of the existing maintenance manuals: “Round the edges of the round cap. If it then turns round and round, as it circles round the casing, another round of tests is required.” This example shows that the word “round” is used with different meanings and roles (as a verb, as a noun, as an adjective) and clearly illustrates the need for significant improvement of the accuracy of the communication in aviation maintenance[8].

It is necessary to stress that the above example does not mean that the previous maintenance texts were not technically or linguistically correct, but accurate text and correct presentation are not always sufficient. The selection of the English words was (and is) not easy and some users still make mistakes with texts that authors think are written in good English.

In most cases, a given word is restricted to one meaning (to reduce lexical ambiguity), and a given meaning is represented in the vocabulary by only one word (to reduce synonymy). For example, “follow” can be used in the meaning “to come after” and not in the meaning “obey”, and “start” is a legal simplified English word, but “begin” and “initiate” are not allowed [9].

***Conclusion***

While new technologies in aviation are introduced to increase the reliability of systems, human errors during their operation and maintenance can become the primary cause of safety and reliability reduction events. In aviation, the concepts of “Human Factors” are directly connected to maintenance. During maintenance, a maintainer can do an incorrect task that can cause a malfunction of components and systems, which can have important effects on flight safety and aircraft reliability. Aviation (Technical) English used in the maintenance documentation and procedures is important for the correct execution of maintenance tasks, it is especially important when the maintainers are relying on procedures not written in their native language and they do not have a high knowledge of English.

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