MORPHOLOGICAL AND SYNTACTICAL FEATURES OF ESP

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Abstract: This paper aims at investigating the particular features of ESP written discourse encountered in naval architecture texts as part of ESP. A first assumption is made that the language employed in naval architecture is a subcategory of English for Specific Purposes. As part of ESP, it is thus bound to have a set of specialized lexical and grammatical features which are not in the repertoire of the non-users of that particular domain: complex noun phrases, special use of articles, special use of modal verbs, frequency of the passive voice and of present tense simple, long complex sentences, collocations, specialized terminology. Focus will be laid on demonstrating that the morphological features mentioned above are present in the texts which were selected for analysis. Two main morphological categories will be analysed in detail, i.e. the noun and the verb. In the part referring to the nominal component, the noun phrases used in the corpus, the special use of the articles and a process which we consider typical for our type of discourse, i.e. nominalization, will be investigated. In the section focusing on the verb, the voice, tense, aspect and the values of the modal verbs used in naval architecture texts will be analysed.

Keywords: technical english, general english, ESP, naval architecture, scientific English

1. Introduction

Until very recently the greatest effort in the research adn teaching of English in Romania, and in many other countries has been concentrated on English as a general educational and cultural subject. This kind of research and training is really of great importance. However, there now exists, in addition to conversational English teaching and research, a large and growing demand for ESP. In real fact, most of the secondary schools and colleges bear, in one way or the other, a very important part in our social life today.

This is precisely why the characteristic features of ESP, grammatical choice included, which researchers beagn to concentrate on some 20-25 years ago, is one of my principal concern in the present paper. In this respect, R.A. Close (1969:3) maintains that the science students' problem with regard to English is not so much one of specialist terminology as of the kind of grammar, syntax and indiomatic devices that are use in scientific English generally. Unlike science students, the language students' problem with regard to techinical English is one of specialist terminology rather than grammar.

2. Morphological and Syntactical features of ESP

2.1.Passive Voice

It has often been observed that scientific writing use verbs in their passive form to a greater extent than most non-scientific ones. Naval architecture is not an exception. Here is a brief excerpt from Branch's (1970:3) book on naval architecture where six pasive constructions are used within a relatively brief paragraph:

> „*There are two main part of a ship: the hull and the machinary. Diagrams I and II are most self-explnatory. The rear portion of the ship is termed aft, and the extreme rear end is called the stern. When moving stern first, the vessel is regarded as moving astern. The front portion of the ship is termed forwrd, whilist the extreme forward end is called the bows. When moving bows first, the vessel is regarded as moving ahead. Fore and aft are related terms, and often mean the same as bow and stern.”*

In their book devoted to the teaching of scientific English Brookes and Rose(1976:155) substantiate the idea. *„Scientific and technical students will notice that written scientific English is often in Indirect Speech, often in the Passive Voice and always impersonal in tone.”* If you are in the laboratory and your supervisor asks you , „ *What are you doing in this experiment?”,* you naturally answer in Direct Speech, in the first person: *„I am analysing this white substance.”* But if you are writing your notes on the experiment, or writing a lecture or paper for a learned society or a scientific journal, you will write: *„ The white substance was analysed.”* Or perhaps: *„ Upon analysing it was found that the white substance consisted of a mixture of lead and barium sulphates.”* You will never read in an Engish scientific report: *„I noticed”, „We calculated”, „You will observe that...”*An impersonal form is always used.

The same idea is held by Ewer and Lattore when stating that we use the Passive Voice when we have little interest in or knowledge of, the doer of the action but are more interested in what has happened.

Whereas in General English the passive turn is an agent passive, in technical English it is agentless, e.g.:

- *This generally can be done is a few hours*
- *Complete or nearly complete areal coverage is based upon*
- *The density difference here is defined as*

Since the technical language is agentless in many languages(e.g. Enlgish, French, Spanish, Russian), it seems that this is a universal feature of technical lnaguages. This might also be due to the impersonal cause-effect relationship of most scientific experiments, to the presence of an assumed cause, or the desire of presenting the fact unemotionally.

There is also a close relationship between the high frequency of „to be” and its derivatives as compared to its frequency in general language. The frequency of occurence of this grammatical register-marker has a direct bearing upon the use of personal pronouns. All the personal pronouns present a significantly higher value in genenral English than in technical English. Nevetheless, a special note must be made of the „anticipatory it”, found in such expressions as: *it is certain that, it must be mentioned that.*

2.2. The Use of Tenses and Articles

Recently, much interest has been shown in the notion „rhetoric” in the English of Science and Technology, and is the effect that specific rhetorical choices have upon grammatical forms.

This is also the case of Lackstrom, Selinker and Trimble(1977) who first presented thaier ideas to the Third International Congress of Applied Linguistics, Copenhagen, August, 1972. Their research efforts initially isolated two areas of grammar: articles and tense choice. These areas were chosen because they are typical sources of student difficulty and because they seems amenable to their research. Moreover, these two areas of grammar have been difficult to describe linguistically and to teach to foreign learners of English.

In the texts the authors have studied, theory is generally presented in the *future tense*, although it is clearly a concept conceived in the past in relation to the time framework of the reporting. On the other hand, in describing apparatus used in an experiment the writers employed either the *past tense* or *present* depending on the nature of the apparatus. If the apparatus has been devised solely for the given experiment, its description will be in the *present tense*.

As far as the articles is concerned the three authors point out that article choice can occur at any level of the rhetoric hierarchy but it is dependent not upon a particular level as in the case of tense choice but upon the degree of generality which the author wants to express, like in: *Atom is one of the samllest particles of matter.*

These theoretical principles, however valuable they may be, are less practical than the ones presented in Ewer and Lattore's book *A course in Basic Scientific English*(1976). The simple preset tense is used, they say, for actions in the present which happen usually, habitually or generally; for stating general truths, e.g. *Science plays an importatn role in our social life*; for stating scientific laws, e.g. *Water boils at 100 degrees*; for describing processes in a general way, e.g. *A scientist observes carefully, applies logical thought to his observations, tries to find relationships in data, etc.*

It is but natural that such information is to be met with in many textbooks devoted to ESP teaching. I am only going to reffer to Swales(1975), a very useful and practical work for science students. He is perfectly right when saying that in scientific English the main verbs are usually in the *Simple Present tense* because scientific textbook contain information about the present state of scientific knowledge. They describe experiments showing how this knowledge can be obtained. They also show how this knowledge is used in the service of man. These are some examples of the kind:

- *This gas has a greater density than air.*
- *A thermometer measures temperature.*
- *Oxygen and hydrogen are gases.*

After the *Present Simple*, the most common verbs forms in scentific English are those which contain *modals*. They are used with the base form of the verb to give extra meaning to the sentence. Unlike in spoken English, in scientific English it is easier to say exactly what these extra meanings are. Most modals are used to make statements of possibility and probability, e.g. *The bottle can break when droped.*

2.3.Phrasal Verbs

The most frequent particles encountered in naval architecture texts are: *aback, aboard, about, above, abreast, abroad, across, adrift, after, aground, ahead, aloft, along, alongside, apart, around, aside, astray, away, back, backwards, before, behind, below, between, beyond, by, counter, down, downhill, downstairs, forth, forward(s), home, in, indoors, in front, inside, near, off, on, on top, out, outside, over, overboard, past, round, through, to, together, under, underground, up, upstairs and without*.

Table 1 presented below are the phrasal verbs in NAVAL ARCHITECTURE. The total occurrences of these phrasal verbs are 956 and among them there are 166 word types.

Table 1: Phrasal verbs in Naval architecture and their respective frequencies

Phrasal verbs
Accompanied by- 12
Adapt to-24
Admits that-11
Adopted by- 14
Appointed to-11
Attended by- 52
Blame for- 20
Carried out- 34
Carry on- 12
Come up with- 24
Coming to -23
Coming up-12
Complying with- 49

Concern to- 25
Continued with- 13
Cooperates with- 20
Deal with- 40
Delivered to- 25
Deployed for- 12
Detached to- 43
Engraved with- 10
Equipped with- 35
Got used to - 21
Grew fond- 4
Guided by- 5
Handing over- 1
Implemented by- 16
Included in- 12
Increase of- 30
Involved in-40
Look down- 4
Open up- 19
Ordered by- 23
Participate in- 20
Pass through- 8
Proud of- 5
Provide by- 19
Provide with- 10
Refer to -8
Related to -9
Represented by- 10
Resulted in-2
Returned to- 10
Reviewed by- 20
Rewarded by-4
Scheduled for- 21
Shared at- 12
Show that- 45
Solved by- 12
Speeded up- 10
Start from- 20
Started at- 21
Succeed to- 20
Take care off- 12
Take into- 12
Taking off- 20
Transfer to- 15
Undertaken by- 12
Walk through- 12
Work with- 12
Working at- 15

2.3.1. Lexical features of phrasal verbs in naval architecture

Some phrasal verbs have nominalized versions in naval architecture. The following table presents the nominalized phrasal verbs and their respective frequencies.

Table 2: The nominalized phrasal verbs in naval architecture

Back-up 1	Cut-off 22	Make-up 2	Pull-up 1
Break-down 11	Cut-out 6	Pick-up 2	Set-up 65
Break in 1	Lay-out 2	Pull-in 1	Stand- by 10
Turn-on 1	Upturn 1	Pull-out 1	Take-off 3
Turn-down 1	Turn off 2		

From the above table we can see that there are two types of nominalization of phrasal verbs in naval architecture. One is the left branching, and the other is the right branching. The left branching pattern is that the combination of an adverb plus a verb, such as *upturn*. The right branching pattern is that the verb comes first and is followed by the adverbial particle, such as *pick-up, set-up*, etc. In naval architecture most of the nominalized phrasal verbs belong to the left branching pattern.

2.3.2. Semantic features of phrasal verbs in naval architecture

The functional tenor of naval architecture in textbooks, magazines and scientific articles is informative. It is expressed in the most formal way. Therefore it is far more concerned with being accurate and concise than giving variety and color to the way than it expresses itself.
According to their usage in naval architecture, we could classify the phrasal verbs in naval architecture into the following groups:

2.3.2.1. Actions of operating the main and auxiliary machinery and associated control system

For example: *shut down* (to stop working) and *start up* (to start working) are phrasal verbs which are used to describe the actions of operating engine equipment. They usually connect with such words as *engines, valves, throttles, propulsion equipment, generator, machine, prime mover* and so on.

- *Once the injector pump cuts off the high pressure fuel supply the needle valve will shut down quickly under the spring compression force.*
- *After being satisfied that everything in the engine crankcase is correct, start up the crankcase lubricating oil pump and check that at working pressure, oil flows uniformly from all the bearings.*

2.3.2.2. Actions related to the fuel oil system

Fuel oil is thought to be one of the main factors having much to do with the operation and maintenance of an engine. The fuel oil system for a diesel engine can be considered in two parts: the fuel supply and the fuel injection system. For example: when *shut off* is used in the description of the process of fuel oil supply, it means to stop (supply), as in:

- *Once a fire is detected the engine should be slowed down, fuel shut off from the affected cylinders and cylinder lubrication increased to minimize the risk of seizure.*

2.3.2.3. Actions denoting the temperature control

For example: *to heat up : to (cause to) become hot again after it has cooled*

- *Therefore, if the output of a pump should be reduced suddenly and the valve chamber heat up, do not jump to the conclusion that it is fuel running.*

2.3.2.4. Actions related to the dismantling, maintenance, repair and reassembly of engine equipment

For example: *to tighten up: to (cause to) become more firm or severely controlled*

- *Assuming now everything to be in order and the bearings thoroughly cleaned, oiled and refitted, tighten up bearing bolt-nuts by spanner, leaving out the shims from gland, places the tip of a finger.*

2.3.2.5. Actions related to gas exchange

A basic part of the cycle of an internal combustion engine is the supply of fresh air and removal of exhaust gas. There is the gas exchange. The process of gas exchange is: Scavenging is the removal of exhaust gases by blowing in fresh air. Charging is the filling of the engine cylinder with a supply or charge of fresh air ready for compression. With supercharging a larger mass of air is supplied to the cylinder by blowing it in under pressure. Older engines were naturally aspirated—taking fresh air only at atmospheric pressure. Modern engines make use of exhaust gas driven turbo-chargers to supply pressurized fresh air for scavenging and supercharging. In this process, the phrasal verb *blow out (to or cause to be sent out by blowing)* is used to describe the action of gas exchange, such as the following example:

- *Pressurized fresh air charges into the cylinder, blowing out any residual exhaust gases from the last stroke through the exhaust ports.*

2.3.2.6. Actions related to marine communication

For example: *to send out: to cause (something such as a message or goods) to reach other people*

- *For example, if the signals at A and B are sent out simultaneously and arrive at exactly the same time at the ship, it is an indication that the ship is travelling a station continues operation with minor errors. When this happens, a special blink signal is sent out that produces a blinking light warning on the loran receiver from pane.*

2.3.2.7. Actions related to the movement of marine engine equipment

For example: *to fall off: to become suddenly lower; take a downward direction*

- *Even with filters fitted ducts can become partially blocked and fan performance can fall off to upset the balance.*

2.3.2.8. Actions related to the clarifying process

For example: *to clean out: to empty, tidy, or clean (something)*

- *Remove cylinder heads, clean out water spaces, examine valves, etc.*

2.3.2.9. Actions related to the process of explosion

For example: *to blow off: to cause to be removed by explosion or force of wind*

- *In such case the cylinder affected should be of an engine, the explosion wave—if not thus dissipated—can pass along the inside of the engine, blowing off other doors seriatim, either at one or both sides of the engine.*

2.3.2.10. Actions related to the process of insulation drying

For example: *to dry out: to (cause to) become very dry*

- *When commutators are so wet that the insulation does not dry out when the winding insulation is dried, they require special attention.*

2.3.2.11. Actions related to the routine pumping operation and operation of bilge, ballast and cargo pumping system

The pumps employed on board ship can be divided into two main categories: positive displacement pumps and centrifugal pumps. Displacement pumps are those where the volume of the pump chamber

is alternately increased to draw the liquid in from the suction pipe and then decreased to force the liquid out into the delivery pipe. Central pumps are those wherein an impeller rotating at high speed throws the liquid by centrifugal force from the center to the periphery of the impeller where the liquid is discharged through the delivery outlet. Because of the wide uses of pumps on board ships, the word *pump* is frequently employed in naval architecture and many phrasal verbs are derived from the noun *pump*. *Pump up* and *pump out* are cases in point, as in the following examples:

- *If two tanks are installed, the empty tank should be pumped up directly…*
- *The vapor is then condensed, collected and pumped out by the distillate pump.*
- *Any unevaporated sea water is pumped out by the brine pump.*

2.3.2.12. Actions related to the setting of data logging system

For example: *to print out (of a computer) to produce (a printed form of the results of an inquiry or calculation)*

- *When at sea, the data logger is set to print out the state of the total system once every hour. However, if desired, it may be made to print out at any time, allowing an immediate determination of the status of the system.*

Another syntagmatic feature that we have noticed in some verbal collocations is that most verbs combine with nouns formed by derivation, by composition, or with verbal nouns nouns as in *require assistance - a solicita/ cere ajutor, keep a look-out - a executa/ mentine o veghe*, these collocations being literally rendered into Romanian. Most verbal collocations in naval architecture discourse consist of transitive verbs denoting activation and combine with nouns expressing physical objects: *e.g. to jettison cargo - a arunca marfa peste bord; to heave the anchor - a ridica ancora; to handle a ship/rope - a manevra / opera o nava /parâma*. The pattern verb + adverbial particle (phrasal verb) + noun is very common in ship handling situations, being especially prevalent in *anchoring* and *mooring* orders or in the orders given when a vessel sails in and out of the harbour. Occurrences of phrasal verbs followed by nouns are often confusing and create translation difficulties for non-professional translators, perhaps due to the interference of the standard language where some phrasal verbs have more than one meaning: *e.g. pay out the chain - a fila lantul; run out the head rope -a da parâma prova; cast off the bow spring/ head rope -a mola springul prova/parâma prova.*

2.3. Nouns. Noun strings. Adjectives.

Many nouns and adjectives are associated with a preposition which complete their meaning, and any verb which follows them takes the –ing form. The following syntactical relationship may be noticed:

N+V ing+X

where *N* stands for *noun*, *V ing* stands for the *gerund*, and *X* for *any component*. The technical English nouns may be grouped according to the semantic sphere they belong to. To my mind, three different spheres can be observed:

1. nouns which denote ideas or concepts bound to the process of investigation, *e.g. condition for, concept of, success in, purpose of:*
- *The condition for using the apparatus*
- *Serious difficulties were encountered in analysing the substances*

2. Nouns which indicate a process, a mechanism, an operation, e.g.
   - *(...) a centrifugal device for evaporating(...)*
   - *(...)the filter is the main factor in determining(...)*
3. Abstract nouns with modal connotations such as: *possibility of, difficulty in, attempt at, failure in, necessity of.*

Some adjectives also trigger the gerund. In these cases the syntactical relationship is:

A+V ing+ X

Where *A* stands for *adjective*. The most frequent ones are: *capable of, effective in, useful for, suitable for, active in.* As many examples testify, the reccurent prepositions which trigger the gerunds are: *of, in, by, for.* These prepositions occur with a much lower frequency in general English than in technical English literature and are used in different contexts. In general English *of* mainly indicates possesion or belonging, *by* chiefly signals an agent passive, which is not the case in technical English where passive, as mentioned earlier, is agentless. Here are some examples with *by*:

- *(...)the composition of the melt is changed by adding donor and acceptor impurities*
- *(...)by applying a signal to N-P-N first limiter(...)*

It is to be mentioned that absolute gerunds are another example of substitution for long concessive caluses introduces by as or since:

- *Xenon being an inert gas*
- *All these factors being the same*

Gerunds are more frequent in technical English than in general English for two reasons:

1. the nouns and adjectives associated with a preposition maiinly belong to the fundamental technical theory layer.
2. the prepositions which trigger the gerunds occur with a higher frequency in technical english than in general english.

2.4. Connectives

Most conncetives are common to all advenced and compelx thought no matter the field. Some of them, however, have a great frequencyof occurence in scientific writing. They are an important class of words with a dual function, i.e. to connect the different parts of a statement and at the same time to modify its total meaing in some way.

I have classified them as follows:

1. Introducing an alternative: *alternatively.*
- *One old-established method for the dating of geological strata is that of the correlation of fossils; alternatively the relative new method of measuring the rate of decay of radioactive elements cand be employed in many cases.*
2. Introducing a condtion: *if, provided that, unless, whether.*
- *Provided that new sources of power are exploited on awide scale, present supplies of organic fuel are not likely to be exhausted in the foreseable future.*
3. Introducing emhpasis: *above all, actually, clearly, certainly, in fact, indeed, obviously, really, surely.*
- *Some of the factors in successful economic development are, above all, non-economic in character.*
4. Introducing order of events: *in the beginning, eventually, finally, at first, initially, lastly, later on, next, then, in time, ultimately.*
- *Theories regarding the shape of the earth have changed throughout the ages. In the beginning it was believed that it was flat.*
- *Subsequently this concept failed to satisfy people...*

3. Conclusions

After the detailed analysis and assessment of the morphological features present in naval architecture texts, several conclusions became apparent:

1. The process of nominalization is also present in our corpus, emphasizing the idea that naval architecture texts, as part of the technical discourse, favours participants, entities which remain in the discourse rather than processes.
2. As regards the verbal constituent, simple present tense and the passive voice are clearly preferred to the other tenses, aspect and voice.
3. Naval architecture texts make use of plenty of adjectives, the most widely used category being that of descriptive adjectives.

As far as the realtionship between morphological and syntactic features of ESP are concerned, evidence indicates that it is impossible to draw a hard line bwteen th etwo. Typically, any serious morphological treatment of ESP has an impact on syntax.

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