Paragraph construction in scientific and technical research for Bachelor of Sciences students

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Abstract. The research objective is the study of paragraph construction structural peculiarities in scientific and technical text in teaching students of various fields. The article analyses and reveals distinctive features of paragraph construction in scientific research. The study proves that analyses of paragraph structural features conduce to fuller distinction of stylistic originality of scientific text, its architectonics and composition. The article clarifies that in contrast to literary text, paragraph in scientific and technical text is distinguished by far greater concise and accurate structure formatting. The research proves that in the paragraph of scientific and technical text every following utterance, having close semantic relations with a preceding utterance, functions as its continuation. Having analyzed paragraph construction structural peculiarities the authors single out its main distinctive features: standardized size, unilinearity, clarity of hierarchic relations between utterances, logically strict consecutive order of its sequence, tight connection between preceding and following utterances. The study proves that in scientific and technical texts paragraphs are monolithic speech units from which bigger segments of the text are «built» (sections, chapters, etc). By building such units, clear, evident logical division of the text is achieved (speech product), necessary for more precise and objective scientific statements and facts, eloquent evidence of the propositions put forward, theories, hypotheses, etc.

1 Introduction

The study of structural features of the paragraph in texts of various styles (scientific, literary, etc) should contribute to fuller distinction of stylistic originality of these texts, particularly its architectonics and composition. Such studies could also contribute to solving the problem of general patterns in building coherent speech, which has been researched in text linguistics in recent years.

In this study some features of the paragraph construction in scientific and technical text on the basis of distinctive features are reviewed (mainly in functional and stylistic field). As such: size of the paragraph, hierarchic relations between utterances (location, order of sequence, nature of the engagement), cohesion types (connection) between utterances in the paragraph.

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2 Structure of the paragraph

Logical division into «micro-themes» (paragraphs and bigger theme complexes) to some extent is inherent in any coherent speech (this reflects peculiar patterns of human thinking), however the level of typicality of this is not the same in different speech styles. This depends mainly on the specifics of communicative and other (cognitive, aesthetic, etc.) tasks performed by various functional styles, as well as on communication environment [1]. For instance, in oral everyday-colloquial speech, which has a predominantly spontaneous and familiarly informal character, speech act may consist of a number of segmentary and very loosely related statements. In this case, it is hardly possible to talk about a paragraph at all (as an integral speech complex), since spontaneous and informal oral speech has a largely amorphous character.

Known vagueness, relatively vague semantic structure of a paragraph is often observed in literary text (author's speech), especially in those of its varieties that are characterized by a high degree of emotionality. To achieve, for example, the intensity and dynamism of the narrative in literary text, "chains" of mostly simple (usually short) sentences with a high degree of semantic autosemanticism are often used. The "dislodgement" of the paragraph structure in literary text (as well as in larger complexes) is conducted by the diversity of the content of a literary and artistic work. The presence of several storylines, which are often conducted parallel, often leads to a logically inconsistent, "torn" structure of paragraph, expressed in various kinds of digressions, inserts, interruptions, etc.

In contrast to literary text, a paragraph in a scientific and technical text is distinguished by a far greater concise accurate structure formatting, greater compositional monolithic character and completeness. In this, first of all, purely logical nature of the scientific method of narration—nitus to close logical cohesion and strict sequence of the presented thoughts. In the paragraph of scientific and technical text, more often than not, every following utterance, having close sense relations with preceding utterance, turns into its continuation. This causes a prominent continuous (recurrent) nature of the structure of the paragraph.

The possibility of establishing close semantic relations between utterances within a paragraph in a scientific and technical text is based on the uniplanar character of its content [2]. In other words, in terms of content, a paragraph in a scientific and technical text, with rare exceptions, is monothematic.

Since paragraphs in a scientific and technical text usually contain one "train" of thought (one micro-theme), they are usually not characterized by very large sizes.

The size of a paragraph also depends on the nature of the information contained in it. When describing devices of various types of mechanisms, devices, etc., the paragraph consists mainly of simple, relatively short sentences and therefore, as a rule, has a relatively small size.

If the information has reasoning and evidence nature, then the paragraph is dominated by sentences big in size (including complex sentences), which inevitably leads to an increase in size.

Although paragraphs of very large sizes are not typical for scientific and technical text, on the other hand, they are not characterized by "micro paragraphs" consisting of a single sentence (so-called monocomponent paragraphs). Such paragraphs in a scientific and technical text usually consist of a complex big sized sentences, rarely of a simple sentence of a complicated type [3]. In the latter case, a monocomponent paragraph performs, as a rule, either function of the ending, i.e. a summary of the content of the previous paragraphs, or the function of the beginning, i.e. the introductory paragraph, in which the topic of the subsequent paragraphs is concisely formulated.

However, monocomponent paragraphs of such type (i.e. consisting of one simple sentence) have only one (formal) feature of the paragraph — the presence of elements of
external structure (graphic and intonation markings as part of the text). As for the internal (semantic) structure, texts do not have this feature, since they are not complexes of thoughts (utterances), and neither explicit nor implicit (they cannot be spread out into a multicomponent paragraph).

Therefore these paragraphs do not have the status of "true" paragraphs; they can be considered only as quasi-paragraphs that have specific functions in the semantic structure of the text (beginning, ending, and also connecting between multicomponent paragraphs and larger text segments).

As for monocomponent paragraphs that consist only of a complex sentence of big size, in a scientific and technical text they are also used under certain conditions along with simple, multicomponent paragraphs. From the latter, they differ only in a lesser semantic capacity and a closer cohesion of the constituent elements. Such paragraphs incarnate minimal micro-themes in the text, conditioned by features of the content and the target setting (in particular, the desire for synchronous and concise expression of a number of thoughts and a clear distinction of their semantic relations within one micro-theme).

The above-mentioned is heavily standardized size of paragraphs in the scientific and technical text (the dominance of medium-sized paragraphs and relatively small amplitude of their size fluctuations) depicts the ambition for clarity and logical visibility of their semantic structure, which is not uncommon for purely logical (scientific) thinking.

3 Logical connection

In paragraphs with a continuous (recurrent, unilinearity) structure, which is typical for a scientific and technical text, the distinctive functions of individual utterances are distinguished more clearly (than in paragraphs of a literary text): introducing (beginning), revealing and concluding (ending) utterances [4]. Concurrently, the beginning and ending are most clearly distinguished, denoting the upper and lower borders of the paragraph. This is achieved not only by intonation (pauses) and graphic (indenture, spade) means, but also mainly by the generalized meaning of the introductory and concluding utterance: the first usually sets the topic (more precisely, the micro-theme) of the paragraph in the form of a concise wording (premise), the second—summarizes it in the form of a conclusion or final conclusion.

The revealing utterances of a paragraph in a scientific and technical text are characterized by a strictly logical order of sequence, when one statement is strung on another. In the process of this, there is a consistent unfolding and disclosure of the micro-theme of the paragraph with the necessary accuracy and objectivity for scientific narration.

In terms of expression, these characteristics of revealing statements are shown in their thematic and temporal diversity and close logical connexity.

In terms of the semantic hierarchy, individual utterances of the content structure of a paragraph usually differ either in the degree of semantic independence (autosemanticism, synsemanticism), or in the communicative loading (main utterance/non-main utterance).

From the point of view of the level of semantic autonomy in the scientific and technical text, paragraphs with a perspective autosemanty of introductory statements prevail (i.e. semantic independence in relation to subsequent, "revealing statements). In almost all cases, this is the case for paragraphs consisting of a significant number of utterances [5]. In such paragraphs, revealing utterances are usually synsemantic, and concluding utterances are usually characterized by retrospective autosemanticism, which is expressed in their relative independence from previous (revealing) statements. Deviations from such a hierarchy (usual for «speech complexes of considerable size) in a scientific and technical text are usually found only in small paragraphs consisting of an insignificant number of utterances. Firstly, the final utterance is sometimes not an ending, but performs the function of an ordinary
4 Ways and means of interphrase relations

While characterizing the semantic structure of paragraphs by the location of the main utterance, it is noticeable that in the scientific and technical text mainly models of a paragraph with a main utterance in the initial position are used. As for other main and variable models, they are less typical for a scientific and technical text. They also stand out insufficiently clearly, so that in some cases it seems difficult to correlate a particular paragraph to a specific model. The structural and semantic clarity and monolithic character of the paragraph in a scientific and technical text is also achieved by using appropriate means of communication to link utterances. In this regard, the structure of a paragraph in a scientific and technical text is characterized by much more differentiated and precise (than in literary text) expression of semantic relations between individual utterances and their closer connection with each other.

In comparison to the relations between the components of a complex sentence, the inter-phrasal relations within a paragraph are different and more complicated. Besides connective, contrastive, temporal, causal, etc. relations within the paragraph such relations as excretory, particular to the whole, etc., are also often expressed [6].

It should be noted, however, that within a paragraph, the so-called "purely" logical relations (causal, consequential, conditional, etc.) between utterances are much less common than between complex sentences. This is explained, it would seem, mainly by the fact that, by their nature, logical relations are actualized in the form of complex thought, characterized by the direct correlation and close cohesion between its interdependent elements (basis and consequence, condition and conclusion, etc.)

Since the relation between the components of a complex utterance (especially a complex sentence) is more than between the utterances of a paragraph, than such thoughts are actualized with the help of appropriate models of a complex sentence [7]. This is confirmed, in particular, by the fact that the expression of logical relations between independent sentences usually takes place in cases where the corresponding sentences are actually separatized components of a complex (as a rule, a complex sentence).

In adherence to the mentioned diversity of inter-phrasal relations, the ways and means of communication used to actualize these relations are also characterized by a great complexity. In order to achieve a differentiated and accurate expression of various kinds of logical relations between utterances in a paragraph of a scientific and technical text, a syndesis (synthetic) is often used (frequency in a scientific and technical text is 25.6%, in a literary text — 10.4%).

Due to the lesser degree of formalization and clearly expressed lexical meaning, the synthetic elements even more definitely and directly indicate the nature of inter-phrasal relations and thereby contribute to a closer semantic unification of statements within the paragraph [8].

Table 1. The means of communication used to implement inter-phrasal relations.

<table>
<thead>
<tr>
<th>Component</th>
<th>Realization</th>
</tr>
</thead>
<tbody>
<tr>
<td>syndesis</td>
<td>to express logical relations between statements</td>
</tr>
<tr>
<td>non-syndesis</td>
<td>assumes consistent (non-syndesis) attachment of statements to each other, in which the corresponding complex of thoughts is supplemented, clarified and developed (i.e. the corresponding micro-theme)</td>
</tr>
</tbody>
</table>
Asyndetic coordination is conducted mainly by repeating in a subsequent utterance one or other element of the previous utterance (or previous utterances). Concurrently, more often than not it is not verbal, but in one way or another modified repetition.

Anaphoric connection in the paragraphs of the scientific and technical text has an intensive character, which is achieved both by repeated varied repetition of the corresponding elements and by the presence of parallel repetitions. Such an intensive non-syndesis, often combined with a syndesis, ensures the compositional monolithic character of a paragraph in a scientific and technical text.

Despite the above-mentioned use of the syndesis in a scientific and technical text (to express logical relations between statements), in most cases the connection of the utterances in the paragraph is performed by the method of non-syndesis (74.4%).

The asyndetic coordination captures, on the one hand, the well-known complexity of semantic relations between statements, and on the other hand, the ambition to avoid word-for-word repetitions, which under certain conditions (in particular with the abundance of them in a certain sequence) can cause an undesirable stylistic effect for a scientific and technical text (primarily expressiveness) [9].

This type of communication (communication by repetition is sometimes called anaphoric) does not express grammatical (logical-syntactic) relations, but only provides a semantic connection between individual statements within a paragraph. It inevitably arises during the logically consistent unfolding of any complex thought (micro-theme).

One of the types of asyndetic connection with the help of repetition is a connection in which various pronouns are used in the function of repetitions, representing the corresponding elements of the previous statements of the paragraph.

In contrast to the literary text, where the functions of repetitive substitutes are mainly personal and the corresponding possessive pronouns, in the scientific and technical text this function is exercised mainly by demonstrative pronouns; moreover, both in the corresponding nouns, and in the actual representative function, which is primarily inherent to personal pronouns.

The “connective” connection between the statements of a paragraph may be purely contextual in nature. Contextual connection differs from the anaphoric one in the fact that the logical relationship between statements is achieved not by repeating any element that provides their direct, semantic relationship, but by more or less indirectly correlating the semantic content of statements determined by this context (i.e., the topic of a specific text or its individual components).

Contextual (thematic) connection between statements usually takes place in paragraphs with a complex structure, when the contact statements are more or less autosemantic in relation to each other [10]. Due to the fact that multiline paragraphs are not typical for a scientific and technical text, contextual connection in its pure form within a paragraph occurs much less frequently in this text than in literary one (12.8% and 28%, respectively).
5 Conclusion

Thus, the features of the paragraph structure in a scientific and technical text are: to a large extent standardized (optimal) size, unilinearity (monotematicity), clarity of hierarchical relations between utterances, logically strict consecutive order of its sequence, tight connection between them.

In scientific and technical text paragraphs are monolithic speech units from which bigger segments of the text are «built» (sections, chapters, etc). By building such units, clear and evident logical division of the text is reached (speech product), necessary for more precise and objective scientific statements and facts, eloquent evidence of the propositions put forward, theories, hypotheses, etc.

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