

## **The Role of Useful Information in Logical-Semantic Terms (By Way of Illustration of Scientific Text)**

Larisa S. Tikhomirova, Natalya V. Danilevskaya, Elena A. Bazhenova  
Natalya V. Solovyova and Larisa G. Kyrkunova  
Perm State National Research University, Bukirev Street, 15, 614990 Perm, Russia

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**Abstract:** The study gives consideration to useful information from the position of logical Construction of Semantic Units (CSU) in the scientific text. The same information can be conveyed by different logical means, using a variety of language signs to designate corresponding features. Any text must have content sufficiency, that is, be in accordance with the norms of exposition of information as genre, style, type of speech. Therefore, it must contain logical transitions of concise or extended form of information presentation. In this case only, in our opinion, one can ensure optimal information richness in the scientific text.

**Key words:** Scientific text, useful information, valuable information, logical-semantic relations in the text information richness of scientific text, CSU

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### **INTRODUCTION**

The correspondence of the text content to the level of reader's needs is estimated by the measure of information usefulness in the text that is a component unit of the scientific text. It is noticed at the same time that one can understand the logical structure of the text, the meaning of the transferred information but cannot understand the sense that stands behind this meaning, not apprehend the subtext that is intrinsic meaning of all the scientific content. Profundity of reading the text «does not obligatory correlate to logical analysis of the superficial system of knowledge at all but depends more on emotional subtlety of man than on his formal intellect...» (Luriya, 1979). Therefore, one can say that «the subtext is directly related to the information usefulness of the text».

It is known that compatibility/incompatibility of superficial structure of the text and profundity of the structure of content must be regulable. From our point of view such regulator is a useful measure of information that is defined by the text, its designation and an implied addressee. Focus on certain measure of useful (pragmatic) information helps to reasonably increase text density of information and logically structure scientific thought. In this connection two ways of heightening of information value of the text are differentiated: intensive and extensive. The intensive way of heightening of information value of the text «relates to the process of compression of information at the expense of abridgement of the text length by reducing the information volume.

Compression of information makes it possible to express the same thought by more economical speech means». The extensive way «heightens information value via expansion of the information. Its application leads to maximum detailing of statement which allows to deeper penetrate into essence of a phenomenon, expose ties and relations of the studied object with the external world».

Thus, the same information may be rendered by different logical means, using varieties of language signs to designate corresponding features. Additional, explanatory (extensive) information conveyed by specifying, conjunctive, repeated constructions may be considered to be useful, new and even necessary in an educational and popular science article. At the same time, it may turn out to be redundant, logically inept in the text, meant for a specialist and therefore, will lose its valuable features. Thus, to set the measure of information usefulness and get unknown, it is necessary to take into account a target designation of the message.

As it is seen from the studied material, the chain of text-fragments reflecting separate stages of cognition of a research object is generated as science forms (Givon, 1993). In this chain of texts «accompanying» the development of scientific knowledge, one differentiates the texts that have different degrees (levels) of information value (useful information), hence the science content density. Such «fission» of information in the flow of scientific knowledge has influence on completeness and exactness of scientific exposition.

Micro texts that differ within the text in the level of content-richness (depth and thoroughness), are

characterized by different measures of information value (or information compression). So for example, information related to a scientific phenomenon can be represented at different levels of the text concentrating to be considered folded, if to compare information in various

segments of the text space or moreover, in different scientific sources (in a journal article, collected articles, information leaflet, survey and so on). We define such phenomenon (when the same information with different indicators of information value is dispersed over the text space or in different text types) stratification of information flow, that is conditioned by reader's information need (scientists) and as a result represented as «redundancy» of information flow.

Thus, micro texts/texts that vary in the level of informativeness (irrespective of the fact to which of them primary or secondary their tradition refers) are not very different. So, study, brief communication, instructional leaflet can be in one chain of texts, different only in the level of information folding. Therefore, one can talk of information value of the text only comparing it with another text or texts having a common denotation.

## **METHODS**

Constructing useful information in the text according to the stages of scientific exposition is presented in this study in terms of discursive and cognitive approach (Strunk Jr. and White, 1979) that implies text research from the point of view of both cognitive and discursive analysis simultaneously.

Cognitive-discursive constituent of the applied approach is connected with mental operations of the author/reader, who allows not only to reestablish all the formal and semantic connections in structural-semantic space of the text but approach its conceptual structures standing behind separate units and parts of the text and also the scientific text on the whole. Such approach allows to determine the principle of unfolding/folding of the content of the scientific text, reveal the functions of stereotype units (terminological and non-terminological) in building up the scientific text, show in-textual connection of the meanings communicating different types of information in the phrase and between the phrases in «space» of the whole scientific text (Luriya, 1979).

## **RESEARCH**

A specialist in this field of knowledge can define the information value. The critic (expert) must consider the text as the source of information as prospective «model»

of the expanding knowledge, as the means of satisfaction of information interest of the reader. Certainly, that analyzing the text, both the critic and the reader are guided by not the category of informativeness only but also novelty, depth of the content, adequacy to the target purpose and so on.

Passing from the general scientific language to the language of linguistics it should be taken into account the interpretation of information by Galperin who understands information, first of all as factological (or factual) information, stressing hereby that even predicative parts can fully convey information that appears in the text on the whole, hence, extracts information to be content-factual, content-factual, content-conceptual and content-implicit.

Content-factual information represents messages about facts, hypotheses being put forward by researchers, their standpoints and also different assumptions, possible solutions of the problems, etc.; this information is explicit in its nature.

Content-conceptual information conveys the reader the researcher's understanding of relations between the phenomena, understanding their cause and effect relations, their significance in social, political, economic life of people, including relations between separate individuals; this information is retrieved from the whole work, it is always creatively reinterpreted.

Content-implicit information is a hidden information retrieved from content-factual information thanks to the ability of language units to evoke associative and connotative meanings, also thanks to the ability of sentences within the discourse to increment the meaning.

Content-implicit information is considered by Galperin to be optional that is, not obligatory in the scientific text. But as the results of our analysis show, this type of information cannot be present in the scientific text, since the most important in understanding of such type of the text is output knowledge obtained from the scientific text which requires carrying out an operation of the analysis.

In our opinion, the classification presented by Galperin indicates the possibility to get one or the other information from the text, at the same time lining up and restoring the chain of the researcher's reasoning. Therefore, highlighting an aspect of information enables to imagine it in concentrated and explicit form.

Basing on the stated above one can conclude that any text must have informative adequacy that is, respond to a norm of information rendition according to genre, style, type of speech. Only in this case one can talk of a qualitative indicator of information value of the text usefulness. Useful information of the scientific text is a

certain degree of its content-richness novelty of the reader that consists not only in a topic, the researcher's conception, the system of the researcher's estimate of an object of study but in the logical implicit form of expression of the old (known to the reader) knowledge. As a rule, the notion «old» knowledge is an element of redundant information. But redundant phrases (it should be admitted) are the unfolded semantic structures pretending to their definite precision.

These are such phrases that are sometimes absent for example, educational literature, reading books and even in encyclopaedic scientific literature, so long as in spite of a little scientific genre, in such scientific articles the content is usually characterized by folding and high condensation of new knowledge which in some cases leads to logical «clotting» of the scientific ideas and strenuous perception of the text. Illustrate the text fragment from the encyclopedia:

More than 10 species, mainly in the tropics and the subtropics; 3 sorts in Russia, all are poisonous, fancy; the leaves of *D. stramonium* compose antidysrhythmic drugs (asthmatica astmatola); the fruit of *D. uninjuriosum* (American) and Indian contains alkaloid scopolamine. From our point of view, this compact text is rich in autonomous semantic «marks» that are reflected in four complex syntactic units. At the same time, it should be emphasized that three CSU are «scrappy» meaningful segment reflecting description of the sort *Datura*, its seat and concretization of the species in Russia. The fourth CSU introduces a new definition «*stramonium*» and «*uninjuriosum*» *datura*, without explaining the nature of its origin and connection with the previous content. Just owing to absence of semantic repetitions, except lexical (*Datura*), knowledge concentration rich in content and strenuous perception of the text are created.

Therefore, we find it necessary to elaborate according to didactic tasks (for example, in educational, popular science text) unbiased attitude to redundant information. Here, the reasonable turns out to be even repeated, synonymous information. For example, in the paragraph «General Idea of Memory», in the first sentence that defines memory and in the last one, there the lexical repetitions are appropriately used:

- Impressions man gains about the surrounding world... are called memory
- «Without memory», wrote S.L. Rubinstein
- Memory underlies human capabilities
- Without memory it is impossible the normal functioning of any person or society
- Thanks to memory, its improvement man separated from animal kingdom...
- Besides, the further progress of mankind without continuous improvement of this function of memory is unthinkable
- Memory can be defined...
- A variety of instincts, innate or acquired... is nothing but as embodied, descended or acquired in the course of life experience
- Without constant renewal of the experience... living organisms would be unable to adapt to the current fast-changing events of life
- Not remembering what happened to them, the organism simply could not be improved further
- Memory is in all living beings
- In pre-human organisms there are two kinds of memory: genetic and mechanical
- The first is shown in genetic transmission from generation to generation of vital biological, psychological and behavioral characteristics
- The second takes the form of learning ability, acquisition of life experience...
- Opportunities for memorization in animals are limited by their organic device
- Man has his speech as powerful means for memorization...
- He (man) does not need to rely on his organic capabilities as the main means of improving memory... are outside him and at the same time in his hands...
- The man, finally, has three types of memory... arbitrary, logical and mediated
- The first deals with a wide volitional control memory, the second with the use of logic, the third with the use of a variety means of memorizing...
- More precisely... human memory can be defined as psychophysiological and cultural processes that perform in life the functions of memorizing, preservation and reproduction of information
- These functions are main for memory
- They (functions) differ not only in their structure... but by the fact that different people have developed differently
- There are people who for example, memorize with effort and retain the stored material in their memory for a long time
- They are individuals with the developed long-term memory
- There are people who on the contrary, quickly memorize but quickly forget what was once memorized
- They have strong short-term and operative types of memory

An interesting thing in this context is that the researcher's or does not deviate from the subject of study and at the same time deepens knowledge of mental function of memory at the expense of the repeated specializing lexical and thematic blocks. In the present text one can differentiate 6 CSU that constitute 6 thematic blocks disclosing the essence of the set question:

- CSU gives definition of memory (1, 2 sentences)
- CSU communicates importance and necessity of memory in vital functions of man and living organisms (3-10 sentences)
- CSU compares the functions of memory of man and pre-human organisms, including animals (11-15 sentences)
- CSU expresses means of memorizing (16-17 sentences)
- CSU characterizes 3 types of human memory (18-19 sentences)
- CSU considers the functions human memory (20-26 sentences)

Therefore, the whole paragraph of the textbook without any digressions and semantic «breaks» deals with the description of memory.

For approval of scientific knowledge, besides lexical and semantic repetitions, it is necessary for the scientific text to contain both lexical synonyms and thematic synonyms in order to render one and the same content by different means. Compare two fragments of one and the same text: imagination is an essential element of creative activity of man expressed in construction of a form of product of labor; creative imagination implies independent creation of new images embodied in original and valuable product of labor. These texts are similar in terms of content but differ in terms of expression. One should be careful with using these lexemes as it is similarity in defining the terms that can lead to not so thorough understanding of the definition as to misunderstanding.

Synonyms express one and the same subject (denotation) by different nominations. For example, in the field of psychology: imagination fantasy, hypothalamus- limbic system hypothalamus (Vygotsky, 1996).

### **SUMMARY**

Accentuate, that the suggested approach to the description of the scientific text enables to differentially (selectively) view the content of the text. In any case, the

text must have the feature of information sufficiency. Therefore, there must be presented logical transitions of concise and extended forms of information presentation. Only in this case, in our opinion, one can ensure optimal information richness in the scientific text.

### **CONCLUSION**

Thus, the repeated lexical or thematic information is essential for the scientific text in a certain system of description, depending on target of the researcher, scientific genre and type of speech and also communicative tasks. It should be stressed that redundant repetition may be perceived as lack of description as the positive features of the text decrease and it becomes hard to understand. At the same time, it is important: the more thoroughly are eliminated the elements of redundancy from the language means expressing the content of the scientific text, the higher is a semantic power of the text content, the higher are qualitative indicators of the information value of the scientific text, respectively. But, it is impossible to completely eliminate the elements of ambiguity, «roughness» of a natural language as one cannot fully provide for elimination of lexical synonymy and indicate all the logical associations between the words. Therefore, in a good scientific text the means of semantic redundancy and the moments of insufficiency of information are compensated to a greater or lesser extent. And this «compensation», from our viewpoint, must emerge in the text gradually, in the process of expressing of its main content.

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### **REFERENCES**

- Givon, T., 1993. Coherence in text, coherence in mind. *Pragmatics Cognition*, 1: 171-227.
- Luriya, A.R., 1979. *Language and Mind*. MSU, Moscow, Russia, Pages: 320.
- Strunk, Jr. W. and E.B. White, 1979. *The Elements of Style*. 3rd Edn., Macmillan, New York.
- Vygotsky, L.S., 1996. *Thought and Speech*. Labyrinth Publications, Moscow, Russia, Pages: 352.