DEVELOPMENT OF PROCESSES OF SEMANTIC READING AMONG STUDENTS. PRACTICAL RESEARCH OF THE PSYCHOPHYSIOLOGICAL COMPONENT

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Abstract

Global processes of informatization, huge grows of text information, in addition to new requirements to its analysis, systematization and speed of its processing, result in greater demands for the development of new approaches to training in semantic reading. Semantic reading is a type of reading which is aimed at a comprehension of the text.

Process of semantic reading depends on a number of the factors affecting success of this process. The basic ones are psychophysiological features of the reader, its psychophysiological functions that are differently interacting with the components of semantic reading.

The relevance of a research is caused by need of searching and specification of nature of relationship between the processes of semantic reading's formation and psychophysiological features of readers for the purpose of the indirect development of processes of semantic reading.

Activation of psychophysiological functions of the person during the work with a text is one of the leading goals of semantic reading's studying.

The research was made on the base of Ural Federal University. 240 students (133 girls and 107 young men) at the age of 18-24 years (average age 21 years) took part in a research.

For determination of features of psychophysiological functions, potentially linked to processes of semantic reading, we chose the techniques directed to determination of properties of memory, attention, thinking, a profile of sensorimotor asymmetry, and the type of nervous system. In addition, we tested the speed of reading of the examinees, completeness of the text reproduction. For determination of semantic structure of the text, we used Propositional Analysis of Thorndyke.

According to the results, the most important factors influencing understanding of the text were such psychophysiological functions as memory and attention. Such processes of semantic reading as understanding of the general meaning and the main ideas of the text reflected in propositions of the higher order were the bound to such components of psychophysiological functions as stability and concentration of an attention and level of accuracy of complete representation of a short-term working memory. Perception, storing and reproduction of propositions of the lowest levels were directly bound to resources of endurance of an organism.

Besides, understanding of the general meaning of the text was interrelated with the ability of the examinee to the categorization and determination of verbal communications during the memorization and reproduction of separate symbols and words. Level of a stress that reflects a mental and physical state of reader affected concentration and volumes of memorization and reproduction of information. Such psychophysiological features as sensorimotor asymmetry and force of nervous system also had particular influence. The dominance of left profile of sensorimotor asymmetry led to increase in efficiency and decrease in quantity of mistakes in tasks dealing with separate symbols and words. People with strong type of nervous system had higher indicators in processes of memorization and reproduction, concentration of an attention, and, therefore, in general were more successful in semantic reading and learning.

The speed indicators of reading, reflecting the speed of viewing of information units, in particular separate symbols, words and propositions, characterized more the general technology of reading, rather than processes of semantic reading.

Keywords: Semantic reading, students, memory, perception, sensorimotor asymmetry, attention, type of nervous system, speed of reading, text reproduction, propositional analysis.
1 INTRODUCTION

In modern society, the ability to reading cannot be confined only to mastering of technology of reading. Reading is a constantly developing set of knowledge, skills and abilities, i.e. the certain qualities of the human that have to be improved all his life. Conscious reading is the key to success in studies, self-realization and active interaction with the world around [1].

Global processes of informatization of society, huge growth of text information, and presentation of new requirements to its analysis, systematization and speed of its processing lead us to need of development of new approaches to training of semantic reading. Semantic reading is a type of reading which is aimed at the understanding of the text [2].

Process of semantic reading depends on a number of the factors affecting its success. The basic from them is psychophysiological features of the reader, the psychophysiological functions that are variously interacting with the components included in a semantic reading [3]. Thus, searching and clarification of nature of interrelations between the processes of formation of semantic reading and psychophysiological features of readers, leads us to the development and improvement of quality of processes of semantic reading.

2 METHODOLOGY

The research was made on the base of Ural Federal University. 240 students (133 girls and 107 young men) at the age of 18-24 years (average age 21 years) took part in a research.

For determination of features of the psychophysiological functions that are potentially connected with processes of semantic reading, the following methods were chosen:

2. Diagnostics of attention and determination of its properties by means of Bourdon test (N symbols, N correct, N mistakes) and Red-Black Tables test (t1 red symbols, t1 black symbols, t2 red symbols, 2 black symbols). [4]
5. Assessment of memorizing and reproduction of the text with use of the propositional analysis with use of Thorndyke’s classical «Circle Island» propositional scheme (proposition all, proposition 1st level, proposition 2nd level, proposition 3rd level, proposition 4th level). [7,8]
6. Assessment of speed of reading and coefficient of reproduction of the text. Two texts were used with a difference in 2 weeks (V1 reading, K1 reproduction, V2 reading, K2 reproduction). [9]

Statistical data processing was carried out in the Statistica 13.0.

3 RESULTS

To define interrelation between the studied psychophysiological functions and parameters of semantic reading, the correlation analysis was carried out. Based on the matrix of correlation the cluster analysis was done. According to the cluster analysis, we received the Dendrogram of distribution of the studied parameters (Fig. 1) including both components of semantic reading and indicators of characteristics of the studied psychophysiological functions.
The visual analysis of tree diagram allows selecting six main clusters.

3.1 The first cluster

The first cluster included three indicators of time of the Red-Black Tables test (t1 red symbols, t1 black symbols and t2 red symbols), defined the time response characteristics of attention and told us about the degree of focus of the reader on the first three blocks of a task. In addition, indicators of reproduction of the first and second levels of propositions (proposition 1st level, proposition 2nd level) belonged to this block. These were the propositions of higher levels contained the main semantic loading and respectively had bigger meaning for the reader. One more indicator of this cluster was the total result of propositional reproducing reflected the overall level of understanding of the text. The last indicator in this group was the coefficient of assimilation of the first text (K1 reproduction). It reflected the information volume, which readers assimilated and reproduced because of reading the first text, and connected with such properties of thinking and a short-term memory as the level of accuracy of reproduction and level of understanding of separate sentences and the text entirely.

Thus, the first cluster showed us that such processes of semantic reading as assimilation of the general meaning and of the main ideas of the text are connected with such components of psychophysical functions as stability and concentration of attention and level of accuracy of complete representation of a short-term memory. Within cluster, it is also possible to trace, the attention has higher interrelation with assimilation of the first text as in this case, readers faced a task for the first time and therefore they need more resources of attention.

3.2 The second cluster

Indicators of a short-term memory (verbal visual memory, symbolic visual memory) were located in the second cluster. They were characterized by ability to memorizing of separate symbols and complete words. To perform a task, readers had to involve such properties of thinking as ability to a categorization and assimilation of meaning of separate words. In addition, here was the indicator of
productivity of assimilation of the second text (K2 reproduction), showed the information which readers assimilated and reproduced because of reading the text. It reflected such properties of thinking and a short-term memory as the level of reproduction and level of understanding of separate sentences and all the text, taking into account previous learning.

In this case, attendance in one cluster is caused by direct interrelation of indicators of volume of a short-term symbolic and verbal visual memory, associative and verbal logical ways of memorizing, thought processes of a categorization and reproduction. It is also necessary to add that assimilation of the second text has more strong interrelation with processes of a short-term memory.

The second cluster shows that assimilation of the general meaning of the text is interconnected with ability of the reader to a categorization and establishment of verbal communications during the memorizing and reproduction of separate symbols and words.

The first and second clusters are included in an overlying cluster. This construction, thus, integrates both indicators of assimilation of the general meaning of the text with processes of support of stability and of concentration of attention, volume of a short-term visual symbolic and verbal memory and ability of the readers to a categorization and building of verbal logical communications during the memorizing and reproduction of separate symbols and words. Assimilation of the text demands high concentration and orientation of the consciousness of readers on an object - text. This process includes information processing and use of information obtained by means of sense organs and concurrent process of accumulation, preservation and reproduction of information. At the same time, the attention and memory interact among themselves and in a complex provide processes of semantic reading.

3.3 The third cluster

Indicators of short-term audio memory (verbal audio memory, symbolic audio memory), reflected the volume of memorizing and reproduction of separate symbols and words, were included into the third cluster. The next component of this cluster was the accuracy of the answers in Bourdon test (N correct) which defined degree of concentration, stability and selectivity of attention to the performed task. In addition, here the level of a stress (stress) showed in what status there were readers during a research entered.

The connection of these indicators could be explained by the fact that people with less stress remember and reproduce information more successfully. They are also more attentive, than other ones. It is necessary to understand that the person has some limited attention resources. At a stress these resources are distracted by stressful factors therefore, it becomes more difficult to concentrate. As we already spoke above, processes of memory and attention cannot exist the friend without friend therefore the stress level affecting first of all concentration, influences also on volumes of memorizing and reproduction. Therefore, this cluster shows how the high level of a stress affects our memory and attention adversely.

All three previous clusters are integrated in one cluster by the principle of interrelation of memory and attention and their leading role in processes of semantic reading. Besides, processes of memory and attention are influenced by a status in which there is a person. Therefore, the level of a stress is also important for efficiency of assimilation of information in the course of semantic reading.

3.4 The fourth cluster

Indicators of quantity of dots in quadrants of the Tapping test (N1 dots, N2 dots, N3 dots, N4 dots, N5 dots, N6 dots, N7 dots, N8 dots) which reflect the rate of activity and working capacity of a nervous system of the readers were included in fourth cluster. In addition, here were indicators of reproduction of third (proposition 3rd level) and the fourth (proposition 4th level) levels of propositions in the propositional analysis of the text. These were propositions of lower levels contained various specifying and complementing elements. Such elements, on the one hand, had not essential importance for the reader, and on the other hand, gave the possibility of broader reflection of the text. One more indicator in this group was indicators of time of the Red-Black Tables test (t2 black symbols) defined the time response characteristics of attention and told us about the degree of focus of the reader on the last block of a task.

The connections creating this cluster show that perception, memorizing and reproduction of propositions of the lowest levels is directly connected with resources of endurance of an organism. If resources are not enough, there is no opportunity to spend them for units of meaning, which are less
important, to spend them on reflection on details and the complementing information of the text. There is a similar interrelation with the indicator of time of the last part of Red-Black Tables test which is carrying out against the background of the developing exhaustion, and so demanding additional resources of working capacity, high concentration and endurance of attention and being thereof, the most difficult part in comparison with other parts of the test.

Thus, the more endurance of nervous system, the more attention of reader and the more information he is capable to receive in the analysis of the text.

### 3.5 The fifth cluster

The following indicators of neuropsychological tests were included into the fifth cluster: quantity of the represented elements (N elements), quality of performance (quality) and quantity of the made mistakes (errors). This task defines quality of operation of the kinetic mechanism in the block of programming and control of a brain. The next component of this cluster was the indicator of quantity of errors (N mistakes) of Bourdon test reflected violation of concentration and stability of attention. Other indicators of the cluster were indicators of functional cerebral laterality (right-brained, left-brained).

The functional asymmetry of a brain of readers, apparently, defines features of operation of the kinetic mechanism in the block of programming and control. Besides, connection of a profile of a cerebral laterality with productivity of neuropsychological test and quantity of errors in neuropsychological probe and Bourdon tests, perhaps, is a consequence of power function of the left hemisphere. The high level of power exchange in the left hemisphere is based on domination of parasympathetic influences, reducing loss of energy that leads to the fact that readers with the prevailing left hemisphere are more productive and make less mistakes.

The fourth and fifth clusters are also integrated in one block. In this case, the interrelation goes by the power and sensorimotor principles reflected in interrelations of a profile of laterality and working capacity with productivity, quantity of errors and perception of propositions of the lowest level.

Clusters from the first to the fifth were interconnected based on connection with the indicator reflecting the power of nervous system (IPNS). This connection could be explained by the fact that people with stronger type of nervous system have higher rates in processes of memorizing and reproduction, concentration of attention, and, therefore, in general are more successful in assimilation of material. It is possible to say that assimilation of the read material has some communication with the power and with type of nervous system. On the other hand, such factors as attention, memory and a profile of laterality have influence that is more considerable. Thus, typological features act only as the least important of success factors on achievement of good assimilation of information from the read text.

### 3.6 The sixth cluster

Indicators of speed of reading from the first and the second texts (V1 reading, V2 reading), and the number of the browsed signs in Bourdon test (N symbols) entered the last cluster. These were the speed indicators, reflected the speed of viewing of information units, in particular separate symbols in Bourdon test and words and sentences in the texts. This cluster stands alone. It is least interconnected with the others. It characterizes the general technology of reading, rather than processes of semantic reading.

### 4 CONCLUSIONS

Summarizing the analysis of the obtained data, it become clear, that the most important factors influencing assimilation of the text are such psychophysiological functions as memory and attention. Such processes of semantic reading as assimilation of the general meaning and of the main ideas of the text reflected in propositions of the highest level are connected with such components of psychophysiological functions as stability and concentration of attention and level of accuracy of complete representation of a short-term memory. Perception, memorizing and reproduction of propositions of the lowest levels is directly connected with resources of endurance of an organism. Besides, assimilation of the general meaning of the text is interconnected with ability of the reader to a categorization and establishment of verbal logical connections during the memorizing and reproduction of separate symbols and words. Level of a stress that reflects a human condition of reader affects concentration and volume of memorizing and reproduction of information. Such psychophysiological features as hemispheric laterality and power of a nervous system also have a
certain influence. The left profile laterality leads to increasing in efficiency and decreasing in quantity of mistakes during performance of tasks by the readers. People with stronger type of a nervous system have higher rates in processes of memorizing and reproduction, concentration of attention, and, therefore, in general are more successful in assimilation of the text. The speed indicator reflecting the speed of viewing of units of information, in particular separate letters, words, propositions and sentences, characterizes technology of reading in general, rather than processes of semantic reading.

REFERENCES


