THE INFLUENCE OF COMPUTER GAMES ON THE COGNITIVE ABILITIES

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The purpose in front of researchers: to learn the psychological and psychophysiological consequences of the long-term unproductive activity forms in a cyberspace, the example of which is playing activity.
The research results of efficiency of mnemonic abilities have revealed significant distinctions between the experimental and the control groups on efficiency of all memory levels: mechanical, I.e. memorizing with support on functional mechanisms; to memory with appearance of semantic treatment, I.e. memorizing due to functional and operating mechanisms; to logical memory, I.e. with prevailing of regulative mechanisms (memorizing due to the functional system of mnemonic capabilities).
Key words: cyberplayers, cognitive abilities, cognitive ability, sensomotor parameters, functional systems realizing cognitive abilities.

The development of informational society, being based on creation and wideuse of information-communicational technologies in all spheres of social life, became the subject of the broadening circle of researches. Computerization, is not only the stage of scientific and technical progress, but it is also a new, higher level of civilization on the whole, which brings the substantial changes both in human activity and in his personal characteristics.

One of the discuss problems of cooperation between man and computer is a problem of psychical changes in the conditions of global informatization of the society. The development of information technologies goes very fast, concerning all spheres of human life, so that a new cultural and historical environment arises, the main criterion of which is computerization of human vital functions and transformation of computer in the forming element of culture. Computer activity, as a new type of the indirect activity, reconstructs its subject's consciousness, subject of cognition and subject of intercourse. Consequently, human perception and awareness of the world, processes of memory, thoughts, imaginations which are armed and simultaneously limited by the concrete-historical system of values, inherent to the certain social community, one or another culture (to the culture of computerization), changes.

Availability of computer technologies and usage expansion of it's possibilities both in professional and in a leisure sphere put a purpose in front of researchers: to learn the psychological and psychophysiological consequences of the long-term unproductive activity forms in a cyberspace, the example of which is playing activity.

According to the purpose, hypothesis and research tasks such psychological and psychophysiological methods were used in this work as:

1) Method of memory studying, by V.D.Shadrikov and L.V.Cheremoshkina, directed on definition of efficiency, a level of development and a qualitative originality of natural caused and lifetimely formed mechanisms of mnemical abilities (functional, operational and regulating) [16]. As a stimulant material were three figures of different degree the complexities consisting of direct crossed lines.

2) Method of time measuring the reactions of left- and right-parencephalons on visual, skin and auditory stimulants [8, 9]. On the indexes of time of motive reaction the functional state (level of cerebral structures activity) of sensory areas of right and left parencephalons, participation of the regulative and activating systems, was estimated in the process of intellection.

During the research two groups of examinee were selected.

An experimental group (cybergamers) consisted of college students, playing computer games during the last 6 years on the average for 6–7 hours a day. The number of examinees in the experimental group was 33 men (16 girls and 17 boys). A control group was made up by students with low cybergaming activity. The examinees's age was 16-19 years.

The results of questionnaire allow to say that the group of cybergamers differed from the control group by the expressed changes of the state of health. For the absolute majority of students protractedly and systematic playing the computer games rapid fatigueability, crabbiness, high degree of attention instability and considerable difficulties in their own conduct management, is marked.

The research results of efficiency of mnemonic abilities have revealed significant distinctions between the experimental and the control groups on efficiency of all memory levels (tab. 1):

• mechanical, I.e. memorizing with support on functional mechanisms (FM);

•to memory with appearance of semantic treatment, I.e. memorizing due to functional and operating mechanisms (FM and OM);

•to logical memory, I.e. with prevailing of regulative mechanisms (memorizing due to the functional system of mnemonic capabilities (FSMC)). The analysis of the results showed that the productivity of natural memory (functional mechanisms) and memory, provided by semantic treatment at an examinee, systematic playing computer games, is below as compared to the control group ($r<0,05$).

Especially it should be noted that distinctions between experimental and control groups were increased as far as complication of the material produced for memorizing. The efficiency of logical memory of active cyberplayers is meaningfully below, than for the representatives of the control group. These results allow to consider cyberplaying activity as a factor, affecting on efficiency of display of not operating, but regulative mechanisms of memory.

These results of lower efficiency of examinee's memorizing, systematic playing computer games, compel to study the features of functioning of their cerebral structures in the process of cognitive activity.

By the most adverse sign from the point of effective realization of cyberplayer's cognitive capabilities it is possible to consider lower functional state of all sensory areas of left- and right-parencephalons, which is registered on the decline of the sensomotor reacting speed on all produced signals. It enables to suppose that examinees, protractedly and systematic playing computer games, the time of information processing is meaningfully increased already on the stage of its perception.

The next important neuropsychological indicator of cognitive activity was a change of motive reaction time (increase - reduction) after the cognitive loading compared to quiet state. This index was used as an degree indicator of cerebral structures activating while memorizing the figures of different complication and served as convincing evidence of physiological cost of the expended efforts (table. 2).

So, for example, while memorizing figure 2 (the most simple material for memorizing) cyberplayers had a higher degree of cerebral centers activating. However, this group did not succeed to attain the level of cerebral structures activity, registered in the control group which had considerable superiority in the functional state of cerebral educations already in relative rest state.

While memorizing figure 3 (material of middle complication) strengthening of sensory areas activity of left- and right-parencephalons was fixed in both groups of examinees. Thus their right parencephalons activating was identical. However, the cyberplayers' left parencephalon was activated considerably weaker as compared to a control group in this situation . This fact rotined considerably less functional possibilities of examinee's left-parencephalons, protractedly

and systematic playing computer games, at complication of the memorized material.

Yet more expressed distinctions of functional possibilities of cerebral structures in the compared groups of examinees emerged on the stage of memorizing of the most difficult material (figure 9), requiring active involvement of regulative memory mechanisms. The produced loading of control the group examinees was accompanied not only with high-rate of the registered reactions but also with considerable increase of activity degree of sensory educations in the process of memorizing. While working with such a difficult material cyberplayers were caused the sharply expressed decline of the functional state left- and right-parencephalons. Otherwise, this cyberplayers' mental loading resulted not as activating, but as braking of cerebral structures.

The got results allow to do the following conclusions:

1. Examinees, playing the computer for 6-7 hours a day, characterized by a lower efficiency of memory and have a greater amount of complaints about their mental condition, showing up in restlessness, crabbiness, weakness of volitional processes and difficulties of conduct control as compared to the coevals.

2. Cyberplayers show the weakness of activating cognitive processes, that causes inability to maintain the protracted mental loading.

3. The conducted research let's to suppose that an excessive infatuation for computer games deforms cognitive capabilities and results in the decline of physiological possibilities of brain.

Table 1. The middle indexes of mnemonic capabilities efficiency (in sec)

Group of examinees	Time of the produced figures memorizing (in sec)		
	figure №2	figure №3	figure №9
Experimental (cyberplayers)	3,3±0,15	13,8±0,69	116± 5,8
Control	1,5±0,075	4,6±0,23	38±1,9

Table 2. Indexes of degree accelerations of sensomotor reactions, reflecting the value of left- and right-parencephalons activating on each of the experimental stages (in %)

Stages of experiment	diagnostics FM (figure №2)		diagnostics OM (figure №3)		diagnostics FSMC (figure №9)	
	right parence-phalon	left parence-phalon	right parence-phalon	left parence-phalon	right parence-phalon	left parence-phalon
Experimental (cyberplayers)	11,8	13,4	5,6	3,9	–2,2	–3,2
Control group	7,3	6,49	5,04	9,5	4,4	–3,1

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