Formation of adequate psychophysical readiness for action in extreme situations

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Abstract

As a result of the accelerated pace of development of the civilization, along with the positive results, it had negative consequences. The external (natural and social) environment and the internal (mental and physical) environment of modern man have changed. The strength of the influence of the factors of the environmental conditions, which are considered to be extreme, has increased. The complex of influences of the factors of the external and internal environment, which require active actions, is defined as extreme situations. The global factors influencing extreme situations are danger and difficult, and their integral functions are risk and effort, respectively. To overcome these situations it is necessary to form adequate situational psychophysical readiness. It is made up of physical and mental elements that are highly determined. The formation of adequate situational readiness is carried out through the application of certain methods of influence such as thought control, psychophysical relaxation, ideomotor modeling training and others.

Key words: extreme, situation, adequate, readiness, impact, methods, control, thinking, relaxation.

Introduction

Modern civilization is developing rapidly. Along with the achieved positive results in all areas of human activity, there were some negative consequences in the life of modern man. There have been changes in the natural environment due to pollution of air, water and soil. Natural disasters are becoming more frequent – fires, hurricanes, tornadoes, floods, droughts and more.

There are also changes in the social environment. Many favorable conditions for human development have been created. Great opportunities for his professional growth have opened up. As a result of the accelerated development of science, many inventions and modern technologies have been created, which have been used to develop new weapons of destruction. Economic, ideological, spiritual and political crises arose in the social environment. All these changes in the conditions of the external (natural and social) environment have affected the internal (mental and physical) environment of man. The danger to the life and health of the individual and human communities has increased. Their activity and adaptation in these environmental conditions is very difficult. At some point, a person can be affected by different factors of the external (natural and social environment) and internal (physical and mental). Man is in the so-called **extreme situation.**

Results and Discussion

Extreme situations are a special kind of situation. The term “situation” comes from the Latin word “situs”, meaning “location, position, being, inhabiting, living”. In summarizing the different views of situation researchers, it is defined as a complex of environmental conditions. All environments are

made up of many components that manifest as **conditions.** One very large part of them does not affect the person, and another affects him. The components of the environment that affect humans are known as **environmental factors**. Under certain conditions, all factors of the external and internal environment act simultaneously – form a **situation**. The interaction of the factors of the external and internal situation identifies two global factors of the situation – **danger and difficulty**.

Danger is seen as "objective factor on the natural and the social environment that perceives and experiences such as harmful, destructive, and sometimes like fatal for his (on human) physical, mental and social it exists" (G. Yolov, 1981, p. 32). People perceive danger based on experience. They define it as a negative event that has a harmful, destructive effect. Awareness of the danger most often causes negative experiences, it increases tension. In the past the situation is characterized by qualitative and quantitative side. The quality of the danger depends from the content on factors on environments that have a significant impact on humans. Quantitative danger is assessed by the degree of mental and physical stress (psychophysical stress).

The degree of danger can be assessed expertly by the pressure as very small (I) , small (II) , medium (III) , large (IV) and very large (V). The pressure experienced is a variable character , and this gives opportunity for the expression such as function from the time (Fig. 1).

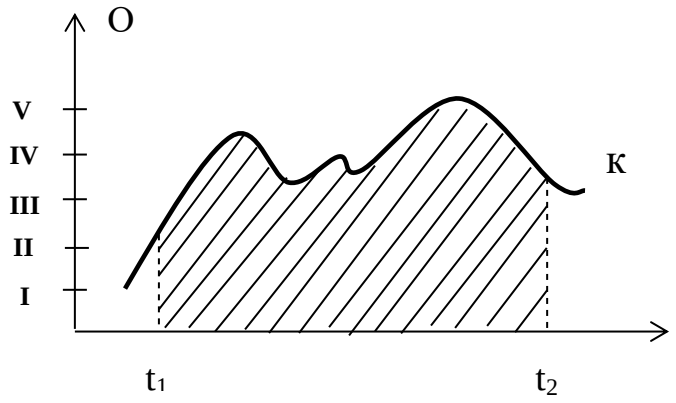

Figure 2 – Dynamics and development of the danger
(according to D. D. Kaikov, 2018)

On x the horizontal axis (t) counts the time for which there is a danger of a situation . Vertical axis (O) reflect the degree of danger. Received the curve is continuous, which gives opportunity for hers differentiation and integration. At ***differentiation on function*** on the curve *K* is determines dynamics on danger (D_o).

$$D_o = \frac{d\mathrm{O}}{dt} \tag{1}$$

The locked area between the curve K and the fixed time t_1 $_1$ and t_2 in the development of the danger expressed the cost on energy (*R*) , which is invested in the performed actions, by taking risks and experiencing the danger. Hence the risk can be quantified by energy consumption *R*. Therefore, **an integral function of danger is risk.**

$$R = \int_{\mathrm{t1}}^{t2} \mathrm{O}(t)\, dt \tag{2}$$

Danger is a factor of impact, and risk is associated with targeted action.

The difficulty is targeted as restriction on the activity of man. She appears as barrier for achievement on determined purpose. The difficulty it is always about experience on mentally and

physical exertion. Both danger and difficulty differs with two basic characteristics – qualitative quantitative.

The quality side is determined by the content of the difficulty, and the quantitative one – of the degree on difficulty of the situation. It is accepted to determine the difficulty in five degrees – very small (I), small (II), medium (III), large (IV) and very large (V).

The difficulty on one situation has a dynamic character , who and that gives the opportunity to be expression in such as function on the time of Fr. In fig. 2 reflects this dependence.

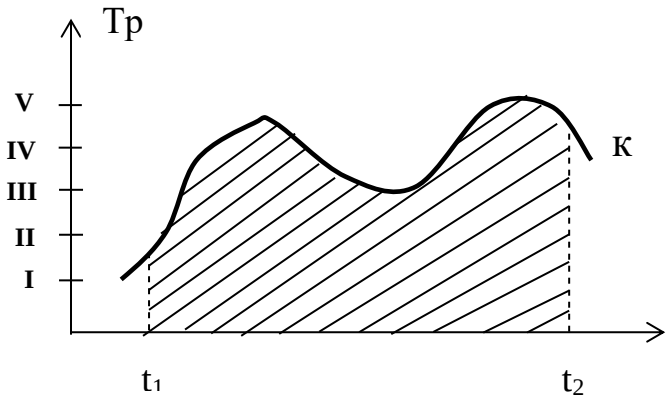

Figure 2 – Dynamics of the course of the difficulty
(after DD Kaikov, 2019)

The degrees of difficulty are reflected along the vertical axis (*T*r). The time (*t*) from t_1 to t_2 is reflected along the horizontal axis. The curve of the function *T*r (*t*) is continuous. There is a possibility for its differentiation and integration. When **differentiating** the function of the curve *K*, the dynamics of the difficulty ($D_{\text{тр}}$) is determined.

$$D_{\text{тр}} = \frac{d\text{Tp}}{dt} \tag{3}$$

Integration on the function of the area locked between the curve K and the axis t determine the **force**. It is a reflection of the energy invested for overcoming on difficulties at specific situation.

$$\text{E}_{\text{тр}} = \int_{\text{t1}}^{t2} \text{Tp}(t)\, dt \tag{4}$$

Situations of the first and second degree of danger and difficulty are considered standard situations. People in such situations are not required to react actively. Situations of III and IV degree are defined as extreme, and situations of V degree as extreme.

Extreme and extreme situations require people to take active action. Adaptation to these situations is intense, mental and physical stress is very high, actions are active. **Extreme situations** are defined as "a complex of difficult and dangerous conditions that require active action for a certain period of time" (D. Kaikov, 1986, p. 18). Extreme situations include all situations that to one degree or another are related to requirements for active action. Such are natural and social disasters, crises, terrorism, wars, pandemics and others. Everyone gets into different extreme situations. Many of them overcome them. By systematically overcoming various extreme situations, a person improves. Many people **do not react** adequately in such situations. The most common consequences for these people are post-traumatic stress, various mental disorders and diseases. The effectiveness of actions in extreme situations is determined by the formed **psychophysical readiness** of the person for adequate

actions. Research has been conducted to prepare for action in various extreme situations. A theory and methodology for action in extreme situations have been developed (T. Borisov, 2015), for survival in extreme situations (P. Geshev, 2014), for survival in extreme conditions of military professional activity (V. Madanski, 2013). A methodology for the formation of adequate readiness of students to survive in crisis situations has been developed (T. Marinov, 2015). A model for psychophysical readiness for survival in extreme situations of social disasters has been developed (T. Borisov, 2011). A model for specialized preparation of students for survival in disaster situations has been created (T. Marinov, 2014). A methodology for overcoming extreme situations has been developed (D. T. Kaikov, D. D. Kaikov, 2021). The essence of human resources management in crisis situations is revealed (V. Vassilev, 2021; pp. 40-42); The essence of the crisis PR and its role, etc. are revealed. (V. Vasilev, D. Stefanova, V. Cherkezov 2019; pp.61-62)

Overcoming extreme situations is determined by the effectiveness of active actions, which are a function of **situational psychophysical readiness**. It is made up of situational mental and situational physical readiness, which are in unity.

Situational mental readiness is defined as "an immediate, overall mental state, which is determined by the degree of active human adaptation to extreme conditions" (D. Kaikov, 1986, p. 57). **It is made up of three substructures – cognitive, emotional and volitional.**

The cognitive substructure is made up of many interconnected components such as sensation, perception, memory, imagination, imagination, thinking, anticipation. The main factor for the formation of readiness and regulation of actions is **thinking.** Through thinking, the situation is realized, the nature of the danger and the probability of possible damage are assessed. The dangers and difficulties of the situation are assessed, the readiness for overcoming it is determined. Based on the assessment of the situation and the readiness for action, a decision is made, which takes place in several stages:

1) Awareness of the extreme situation;
2) Birth of motives;
3) Struggle of motives;
4) Victory of one of the motives;
5) Decision making.

Deciding to act in a particular extreme situation is a process of thinking and will. After the decision is made, its implementation is carried out.

Emotional substructure determines the activity of the person and appears as an energy side of the situational readiness. The emotional substructure of mental readiness is made up of emotions of different content and strength, which are manifested in readiness and actions as an experience. They affect with different force on the cognitive and volitional substructure of mental readiness. Emotions fear, anger, anxiety, hatred, envy, despair have the strongest negative impact. Courage, love, joy have a positive effect on thinking. Adequate mental readiness is formed. As a result of the interaction of the cognitive and emotional substructure, the volitional substructure of mental readiness is formed.

The volitional substructure is the active side of mental readiness. She is the implementer of the decision taken for action. The main factor of the volitional substructure is the **volitional effort.** It is seen as an applied human force in the process of action in overcoming certain difficulties and dangers. Based on a study of a large number of individuals, a very high correlation was found between volitional effort and physical strength ($R = 0.98$). This pattern confirms the notion of psychophysical unity. With systematic exercise of physical strength, the volitional effort improves, the psyche develops. With the development of strength, valuable volitional qualities such as perseverance, discipline, determination, confidence, self-control are formed. Personality traits, mental qualities and traits such as sustainable mental readiness are realized in practice through situational mental readiness.

Situational physical readiness is made up of the physical qualities strength, speed, endurance, flexibility, agility, strength endurance, explosive power, etc. In extreme situations, they

form the situational physical readiness, which is realized as an external (physical) activity. Physical strength is a basic quality in the structure of physical fitness. Situational physical readiness is considered as an immediate physical condition that determines the external (practical) activity of man. The physical qualities, physical legal capacity, motor skills and habits as sustainable physical fitness realized in practice activity through situational physical fitness.

It has been established that with the increase of the determination between the mental and physical readiness the structure of the psychophysical readiness is improved, the efficiency of the actions in overcoming various extreme situations increases. Adequate psychophysical readiness is formed, through which various extreme situations are overcomed.

Reliable methods have been developed for the formation of adequate psychophysical readiness for action in extreme situations. The creation of new methods and the selection of known methods of influence is determined by the set goals and the solution of specific tasks that affect the reduction of tension, transformation of negative emotions into positive ones and mobilization of forces. An important stage of this process is to increase the working capacity, modeling the activity for future extreme situations. **Five scientific bases** have been used as a basis for the selection and creation of means and methods for influencing the formation of adequate situational psychophysical readiness for action in extreme situations:

1) Unity of mental (internal) and physical (external) activity;
2) Saving of vital energies;
3) Unlocking the psychophysical reserves;
4) The short – pressure reaction phenomenon;
5) The effect of switching (T. Borisov, 2015, pp.124-125).

The first scientific basis “Unity on mental (internal) and physical (external) activity” builds on the concept for the single structure on the human activity that is determined by the adequacy of situational psychophysical readiness. The adequacy of readiness is achieved by improving its structure. As the strength of the interrelationships between situational mental and situational physical readiness increases, the structure of situational psychophysical readiness improves.

The second scientific basis “Saving life energies” is associated with the rational use of time to solve current problems, reasonable organization of activities aimed at achieving significant goals. Adaptation to the extremes of situations increases. The structure of situational psychophysical readiness is being improved.

“Unlocking the psychophysical reserves” is the third scientific basis for creating methods for the formation of adequate psychophysical readiness for action in extreme situations. The human body has great potential, part of which serves as a reserve. The psyche occupies a central place in the mechanisms for unlocking psychophysical reserves. On the basis of scientific research it is proved that the unlocking of the mental reserves is carried out by optimizing the structure of the situational mental readiness depending on the requirements of the extreme situations to the activity. As the structure of situational mental readiness improves, the positive mental energies increase, which are transformed into physical energies, as a result of which adequate situational psychophysical readiness is formed. A major role in unlocking psychophysical reserves falls on thinking, which is directly related to emotional experiences and will.

The fourth scientific basis “The phenomenon of short circuit reaction” is related to the possibility of forming adequate situational psychophysical readiness. This provides a pre-emptive adaptation of man to extreme situations that are likely to occur in the near future. As is known, the mechanism of the volitional process in the preparatory stage is developed according to a certain algorithm. When a specific situation arises, there is a need to react. The operations of the volitional process until the decision is made are carried out ahead of time on the basis of an imaginary extreme situation that may occur.

“Switching effect” is the fifth scientific basis for creating methods for the formation of adequate psychophysical readiness to act in extreme situations. The essence of this scientific basis is the ability to change the content of situational readiness in a short time. In negative situational

psychophysical readiness, negative emotions disrupt its structure. The actions are ineffective. It is possible that the inadequate situational readiness to "switch" to adequate in a short time. "Switching" is based on the concept of rapid change in the extremity of situations and hence – on the rapid change of situational readiness as a dynamic state that determines the adaptation of man to the environment.

The main place in the process of formation of adequate psychophysical readiness is occupied by the **means and forms of mental influences.** Based on the requirements of extreme situations to the activity , the **means of mental influences** are divided mainly into **two groups – verbal (verbal) and non-verbal (non-verbal) means.**

Verbal (verbal) means have a strong impact on the process of formation and regulation of situational psychophysical readiness to overcome extreme situations. When exposed to speech, a number of physiological changes occur. They provoke mental changes, because the first signal and the second signal system perform the same activity in the verbal impact. It follows that speech is the main factor causing one or another physiological reaction. The word appears as a real influencing factor on the human psyche and organism.

Non-verbal (non-verbal) means of mental influences strongly affect the subconscious. A large part (83%) of the information transmitted man perceives is through the visual analyzer, 11% – through the auditory, 3% – with the olfactory, 2% – with the tactile and 1% – with the taste analyzer. For one second the auditory analyzer passes 50 bits information while the viewer receives 100 times more. 15% of the information that the face remembers, is only through listening, 25% – through viewing, and 65% – at simultaneously participation on auditory and visual analyst (St. Lazarov, L. Lazarov, 2010). Therefore, in the process on psychophysical impact is needed to pay more attention to watching and listening. Non-verbal means have a strong effect on emotional experiences. The mechanisms of these means of influence are related to the mechanisms of mental infection, suggestion, etc.

There are **three forms of mental influences – cognitive, indicative and suggestive (suggestive).**

Cognitive form is the main form of mental impact. Limiting information about the nature of the situations that occur in people causes high tension. The most common experiences are fear, anxiety, despair, anxiety, anger. The tension of the expectations decreases significantly with the informing about the nature of the situations. The cognitive form of psychophysical influences consists of four stages:

1. Awareness and evaluation of the set goal and tasks;
2. Analyzing the degree, content and structure of the extreme situation;
3. Assessment of the degree and content of situational psychophysical readiness;
4. Selection of adequate means and methods for psychophysical effects.

The indicative form of mental impact is a continuation of the cognitive form and is conducted in the form of instructions for performing certain actions in extreme situations (Vasilev, 2020, p. 230). Vasilev, 2020, p. 230).

Suggestive form of mental influence is based on the scientific foundations of suggestology. Techniques are applied to instill confidence in one's own ability to act effectively in a given extreme situation. In the suggestive form of influence, non-verbal means are most often used.

Based on scientific bases **methods of influence** have been developed for the formation of adequate psychophysical readiness for action in various extreme situations. **One of the main methods of impact is thought control.** It is known that thinking is the most important mental process through which the essence, regular connections and relations of objects and phenomena of reality are revealed. **Thinking can be negative or positive.**

Negative thinking is characteristic of people with a sharpened ego, which manifests itself as fear, pride, arrogance, greed, thirst for power. E. Tole has reason to claim that "Fear, greed and thirst for power are the psychological instigators not only of war and violence between peoples, tribes, religions and ideologies, but also the cause of endless conflicts in interpersonal relationships" (E. Tole, 2012, pp. 22-23). Based on an in-depth analysis, the author concludes that the "normal" state

of mind of most people is "dysfunctional", even "crazy" (E. Tole, 2012, p. 20). The author considers the "normal" state of mind in the context of negative thinking as "dysfunction", "madness". Negative thinking is associated with negative experiences of fear, hatred, anxiety, worry, resentment, anger, guilt, contempt, envy, arrogance, pride, stinginess and more. (T. Borissov, V. Vasilev 2021; p. 144).

Positive thinking is focused on a positive attitude towards people and their improvement. People with positive thinking "move" civilization forward. They are happy. Thinking is accompanied by positive experiences such as courage, joy, love, confidence, gratitude and more. Positive thinking is the basis of the structure of adequate psychophysical readiness.

Mastering the method of mind control requires one to observe oneself impartial, without evaluation and criticism. The goal is to reveal real emotions and thoughts. To begin with, one needs to make an objective assessment of one's thoughts and emotions in order to transform them if they are negative into positive ones and to reduce tension.

The method of thought control is performed in **three successive steps.** The first two steps include questions and relevant objective answers, and the third is the beginning and the actual implementation of mental decisions. The first step is to determine the content of the thought (diagnosis). The second step involves choosing the content of the new thinking (strategy) and the third is implementing the decision of the second step (practice).

First step. One wonders, "What am I thinking about now? " and frankly answers: "Now I'm thinking about". He must answer objectively about the content of his thoughts at this moment, which questions excite him the most. Many thoughts are related to negative emotional experiences. They disrupt the structure of situational psychophysical readiness to overcome extreme situations. Positive experiences are the basis for the formation of adequate psychophysical readiness.

Second step. It is performed when a person in the first step finds that the content of his thoughts are negative. When thinking is positive, the second step may not take place. In the second step, a strategy is developed to control one's thinking. In performing this step, one wonders, "What should I think about now?" Then he answers: "Now I have to think about…". The content of thoughts should be optimistic, associated with positive experiences of confidence, security, love, courage, self-control. The choice of the content of the thoughts should be made before applying the method.

Third step. One voluntarily redirects one's attention to selected thoughts from the second step. He repeats in his mind: "I'm starting to think about ... ", i.e. the content of the new thoughts selected in the second step. After a few repetitions, he says to himself, "I'm already thinking about ... ". At the end of the implementation of the method it is recommended to build an algorithm for the implementation of mental and practical activities as a system that is subject to management.

Systematic practice of the method of thought control improves attention, perception, memory, ideas and imagination, trains the will, dominates positive emotions, increases efficiency.

It is expedient to apply **the method of psychophysical relaxation**. The goal of psychophysical relaxation is to quickly restore the spent vital energies and to form adequate psychophysical readiness for effective actions (D. Kaikov, 1998).

It was found that after intensively load the recovery processes last 2-3 days . A few minutes after the end of the load, the recovery reaches 60-80% of the standard working capacity. The recovery then continues and exceeds the standard working condition. This one phase is known such as paradoxical phase, "phase of overrecovery" (is exaltation phase), fast sleep. In this phase a person is maximal relaxed, he is half asleep.

The performance of psychophysical relaxation is carried out in a comfortable lying or sitting position of the body, in a quiet environment with normal temperature. The following short verbal formulas are pronounced with closed eyes and slowly in mind:

1. The muscles of the legs and arms are loose, loose. They are loose;
2. Legs and arms relax. They are relaxed;
3. They are heavy, very heavy. They are pleasantly warm;
4. Facial muscles loosen, loosen. They are loose. They are soft, they are very soft;
5. My forehead is cool, pleasantly cool;

6. My breathing is calm, rhythmic and calm;
8. My heart works calmly,
10. I am charged with lifes energy.

The duration of relaxation can be from a few to 30 minutes or more. Getting out of a state of relaxation (restorative sleep) into an awake state is done by waking up – alone or with the help of a loved one. The effect of relaxation occurs about 15 minutes after waking up. During the relaxation, additional influences such as quiet and pleasant music, pleasant natural noises, etc. can be included. The effectiveness of psychophysical relaxation has been proven on the basis of many experimental studies. It was found that after a very heavy load after 30 minutes of relaxation, accompanied by pleasant music, the mental capacity of students studied has more than doubled compared to their ability to work at rest (D. Kaikov, 1998).

One of the reliable methods for the formation of adequate psychophysical readiness is **ideomotor modeling training.** The method serves for formation of adequate readiness for actions in future extreme situations (D. Kaikov, 1998, T. Borisov, 2015, pp. 153 – 155). It includes techniques for mentally replaying actions in accordance with the requirements of situations that are likely to occur in the near future. Three **main tasks are solved:**

1. The first task involves analyzing a specific situation that may occur in the near future. The situation is divided into elements related to the passage of time in seconds, minutes. The elements are studied sequentially, determining which of them are the most dangerous and difficult. Finally, mentally in unity, all the elements of the situation are consistently played out.

2. The second task is related to the mental reproduction of individual movements and actions in accordance with the requirements of the specific elements of the situation related to the time. The necessary movements and actions are mentally performed on each element of the situation. In their implementation, special attention is paid to the experience of confidence, security, determination, self-control and more.

3. The third task is aimed at the full synchronization of movements and actions to the requirements of the individual elements of the situation. The individual elements of the situation and the required most correct movements and actions are played out mentally. After the synchronization of the individual elements of the situation with the movements and actions, the actions in the development of the situation are mentally played out.

Conclusions

This method is performed for each individual situation. Initially, the method is practiced in individual situations with low difficulty, then the number of situations increases and the degree of difficulty increases. IN human consciousness it makes the program and (standby) for action at suddenly situations with varying degrees of extremity . In the systematic implementation of this method, psychophysical readiness is formed to overcome situations with varying degrees of extremity, the imagination, imagination, attention, memory are developed. It is especially useful to practice the method of developing creative thinking and anticipation.

For the formation of adequate psychophysical readiness for action in various extreme situations it can apply **other methods** of influence such as lateral thinking, optimistic syllogism, regulation of muscle tension and breathing, visualization, verbal and nonverbal suggestion, meditation and more. Depending on the nature of the extreme situations, it is appropriate to apply a combination of different methods of impact.

The formation of adequate psychophysical readiness to act in extreme situations is a process directly related to increasing security, improving the health and quality of life of the modern man.

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