

# Peculiarities of Individual Reactivity in the Formation of Emotional-Stress Reaction

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Received: April 04, 2024; Accepted: April 04, 2024; Published: April 14, 2024

## ABSTRACT

Man as a person is a unique, purely individual integral integrity of biogenic, psychogenic and sociogenic elements. His reaction to extreme impacts, assessment and perception of this impact as harmful are determined not so much by innate, biologically fixed mechanisms, as by the whole complex of stable properties of the individual, formed in a particular social environment. The type of individual-psychological reactivity of a given person under conditions of psychological stress depends on these personality properties. Extreme stimuli represent extreme values of those elements of the situation that create an optimal background for activity or at least do not cause a feeling of discomfort.

**Keywords:** Individual Reactivity, Emotional-Stress Reaction

Man as a person is a unique, purely individual integral integrity of biogenic, psychogenic and sociogenic elements. His reaction to extreme impacts, assessment and perception of this impact as harmful are determined not so much by innate, biologically fixed mechanisms, as by the whole complex of stable properties of the individual, formed in a particular social environment. The type of individual-psychological reactivity of a given person under conditions of psychological stress depends on these personality properties. Extreme stimuli represent extreme values of those elements of the situation that create an optimal background for activity or at least do not cause a feeling of discomfort. However, the estimation of the limit at which these elements become "extreme" in their shifts to maximalization or minimalization is a purely subjective, individual value. Depending on the individual type of psychological reactivity, the nature of emotional and behavioral response of different individuals, one and the same objectively extreme impact causes quite different reactions. In the same conditions, different individuals react differently both by the degree of exposure and by the type of effect observed. Some individuals have high tolerance, while others have low tolerance. Some subjects under a given stress-impact improve, others deteriorate their performance.

The possibility of active mental regulation of one's activity is of great importance for a human being. However, this doesn't exclude the role of natural factors influencing the nature of behavior and performance. The biological basis of personality acquires special significance in psychological reactions of an individual to extreme impact [1]. It is known that emotionally reactive individuals show statistically significant deterioration of test indicators when the conditions of activity approach extreme ones. In extroverted individuals under stress-impact inhibitory processes increase rapidly and normalize more slowly than in introverted individuals. However, such typification of personalities based only on psychological analysis isn't perfect enough and has no neurophysiological basis.

Typological features of the nervous system constitute the physiological basis on which individual mental properties of a person are formed. However, the determinant of their formation isn't only the physiological basis, but also the conditions of life, the powerful social influence that education, environment, conditions of collective activity, etc. have on the development of personality. The scientific and theoretical basis of the mind is the concept of I. P. Pavlov and other scientists about the types of higher nervous activity, the basic properties of the nervous system, which are criteria of neurophysiological dimensionality of individual characteristics of humans and animals. Due to these

features of an individual, the ability to form reactions is revealed, resistance to stressogenic influence is determined. The existing definitions of the “strength” of the nervous system and methods of its diagnostics mix the ideas about different functions of the nervous system: the function of generation of the nervous process by brain structures and the function of endurance, efficiency. It is the speed of the primary adaptation of the organism to the influence of arisen conditions that is crucial for the outcome of activity in a stress situation [2]. At the same time, the property of “dynamism” of the nervous system is associated with age and personal characteristics of an individual. Thus, the reaction of a particular individual depending on his personal psychological structure is determined by a complex of qualities. One of the ways of normal adaptation to a stress situation can be the training of a new skill that eliminates conflict, “mismatch”. Another form of psychological reaction to an experimental “threatening” situation can be active, volitional suppression of the perceived information, “non- acceptance” of it in personal terms. Duration of the stage of adaptation to psychogenic stress is determined by the factor of psychological stability of personality. However, the form of psychological protection, and, consequently, the form of behavioral response, can be a disconnection from the reality of the situation with psychological a reactivity or “activity displacement”.

Forms of response to psychological stress situation are developed by a personality in the process of interaction with this situation, through the processes of assessment, likening, decision, adaptation. This dynamic process differs in speed and duration of development not only depending on individual psychological characteristics, but also on neurophysiological particular qualities of organization of the nervous system of a given individual. All this determines the individual character of psychological response of different individuals in a standard emotional- stress situation.

Emotional stress is understood as a complex of negative emotions, to a greater or lesser extent lowering the operational ability of an individual, as a “threat” conditioned emotional experience, which affects the ability of a person to carry out his/her activity quite effectively. In such a context, there is no essential distinction between emotion and emotional stress, as the determining factor is the impact of emotional stress on the individual’s performance. A completely different aspect of assessing the essence of emotional stress takes place in medicine. The main aspect is not on the initial states, but on the final phases of the emotional-stress process, which is the pathogenetic basis of many diseases. As is known, autonomic, sympathetic-adrenal and endocrine correlates are found in any emotion or emotional tension, in the period of psychological adaptation to stress-impact and in the phase of mental inadaptation [3]. However, it is not yet possible to differentiate emotion from emotional stress, and the latter from the so-called “physiological” stress by the complex of physiological reactions that can be objectively registered, by the nature of autonomic and hormonal reactions.

Emotional reaction of a personality is an essential internal condition determining its mental activity. That is why the role of individual, personal reaction of a given individual to external influences in the process of organization and development of the subsequent stress reaction is so great. The

behavioral act of an individual to an external event depends to a great extent on the type of emotional reaction to this event. The personality responds to external influences through the structure of its psyche, in particular through its emotionality. The positive biological role of emotional arousal as an energizer of motivational or informational processes is known. Emotional arousal activates, aggravates distant reception, actualizes needs, fills in certain limits the deficit of information, promotes creative productive activity. Consequently, it is not emotion as such that is the causal factor in the development of the stage of emotional stress reaction, but emotional arousal of a certain quality, of a certain sign. Acute emotional stress, i.e. immediate psychological reaction to a conflict situation, in its basis has negative emotional arousal, acting, as a rule, as a disorganizer of adequate activity. Thus, although the psychophysiological mechanism of emotional tension at psychological stress does not differ from the mechanism of occurrence of “physiological” emotions, the qualification of this state as “emotional stress” is determined by the extremity of the impact. It is determined by individual peculiarities of organization of neurodynamic systems of the brain, personal psychophysiological categories and the level of nonspecific adaptation elements of the brain tissue itself. All stages of stress and breakthrough of the barrier of mental adaptation, are accompanied by general and non-specific biological changes known as stress, bringing all functions of the organism into readiness for response. Vital emotions have turned into special programs of activity of living systems. More precisely, emotions associated with expressed experiences of a certain modality have become fixed in the process of evolution as adaptive mechanisms of immediate response to sudden effects of an external stimulus and “trigger” stereotyped mechanisms of certain behavioral reactions [4]. The development of such emotional- behavioral reactions is carried out not only on the basis of genetically predetermined programs of activity, but also according to fixed programs of behavior, fixed in ontogenesis by the type of the developed stereotype. Thus, the biological essence of emotions also consists in their participation in launching physiological mechanisms of adaptation of the organism to changed conditions of life activity, i.e. mechanisms aimed at maintaining homeostasis at the level of the whole organism. An external signal may not cause a direct response, but due to its informational significance for a given individual, it is capable of changing the dominant emotional state. The dominating emotional state can partially transform in subjective, personal form the informational value of incoming signals. In turn, a new functional program with its own activity motives is formed on the basis of the dominant emotional state [5]. However, in the case of mutual coexistence of different motivations, the formation of a response activity can be realized only when one of them is suppressed, “inhibited”. Such a situation is conflictual in its neurophysiological essence. Since the dominant emotional state is alien to the current activity and disrupts it, it can be qualified as negative. In humans under conditions of conflict of motives and goals of activity, under negative subjective evaluation of activity results, under perception of situations of psychological or physical threat, i.e. under the most heterogeneous psychogenic stressors, the subjectively experienced state is a factor triggering biologically expedient programs of protective behavior with their energetic and physiological manifestations. The system of purposeful action direction as a neurodynamic substrate of behavior organization includes as one of its essential elements

the factor of the internal state of a person, i.e. emotional factor. That is why the process of forming the response behavior of an individual depends to such a great extent on the processes of subjective evaluation of a signal, i.e. on the allocation of the informational value of the signal in a personal, subjective form. This is where the significance of the type of psychological reactivity, dynamism and stability of the nervous system is revealed. A person may not recognize the signal as threatening, adapt to it to some extent. A person cannot suppress emotions as a holistic integral of effector expression. He can, up to certain limits, arbitrarily control only the external expression of the emotional state addressed to the mimic muscles, i.e., control his motor reactions. "An emotion, having once arisen, as a subjective state of a person cannot be eliminated [6]. It can only be a matter of transferring its expression from one effector apparatus to another." Thus, autonomic correlates of emotional arousal, endocrine and energetic processes of the holistic system of "protective" behavior in response to a "threat" continue to be carried out despite the arbitrary suppression of somatic reaction. This is the basis of the visceral pathology that is generated by emotional stress.

Stress reactions from the standpoint of holistic behavior for an individual: characteristic "objective" manifestations of emotional stress, i.e. the structure of emotional-stress reaction depending on the prevailing neurophysiological mechanisms involved in this stage of stress reaction development and individual features of psychological and physiological response of a given organism can significantly differ. The significance of individual physiological or biological manifestations of emotional-stress reaction can be correctly understood only on the basis of system analysis, when assessing individual manifestations as elements of the holistic system of response of a given individual [7].

Hormonal, metabolic, and neurochemical shifts are studied in detail during the development of emotional stress, but there are no systematic studies to assess the dynamics and coupling of physiological reactions of the organism with the nature of adaptive behavior and emotional state in different periods of exposure to stress stimuli. Therefore, many researchers are dissatisfied with attempts to consider stress-response as a complex of biochemical processes in isolation or to study individual neurophysiological, vegetative correlates of psychological stress.

It has already been emphasized that different manifestations of response reactions to psychological stress arise depending on the structure of the response system formed as a result of central processing of external stimuli, i.e. those processes that form the behavior of the organism as a whole in its interaction with the environment. The form of response to a stressor is developed by the individual as he continues to interact with the situation through the processes of evaluation and likening. And the personal response in this process is determinative. Personality structure plays a huge role in the mental processing of traumatic impact, intensity and rate of increase of external impact. In the case of acute intensive impact of a harmful factor, the reaction is usually rough, massive, it masks the features of personality. With less intense and gradual exposure to exogenous factors, the role of personality reaction with its innate and acquired properties is more clearly manifested. The temporal sequence of manifestations of various physiological and biological reactions

is largely determined by the individual peculiarities of the subject. It is here that the "natural" properties of the nervous system, its resistance to the intensity and duration of exposure, the potential of the mental adaptation barrier, etc., are revealed.

Biochemical indicators are more adequate for establishing correlates with acute stress states than with chronic ones. However, they cannot be directly correlated either with the emotional state generated by the stress stimulus itself, or with the whole peculiarity of these stimuli acting on the organism. It has been noted that sharp shifts of certain indicators (biochemical or physiological) occur in those individuals whose level of these constants was higher or lower than the others in the norm. However, of course, it was not possible to discover any definite "markers" of psychological direction. Both biochemical and physiological indices of the emotional-stress reaction are individually very variable: and in a situation of psychological stress there are especially sharp individual fluctuations of the heartbeat rhythm from significant tachycardia in some individuals (over 120 beats per minute) to sharp bradycardia (44 per minute). Variations in blood pressure are also variable: the difference between systolic and diastolic pressure in men, especially in the initial periods of stress reaction, increases significantly, and in women, on the contrary, decreases. The characterization of these autonomic indices in the process of emotional response is influenced by many factors: perceptual processes, informational characteristics of the environment, energy support of the upcoming motor load, and individual characteristics of the subject. However, the informativeness of these two vegetative components of emotional tension is not controversial: both indicators are influenced by the main components of emotional reaction. When studying the complex of physiological indicators accompanying different types of mental tension - operational and emotional, it was found that a number of indicators (heart rate, respiration, skin-galvanic reflex, hand tremor, forehead skin temperature, sweating) change unidirectionally, upward. And only temperature (vascular) reactions of the upper extremity under emotional stress sharply decreased (up to 8°C), while under surgical stress either did not change or increased. There is a lot of data, especially obtained in the study of emotional stress in humans, about very low correlation of different types of autonomic reactions [8]. The response of the autonomous nervous system to a situation of psychological stress is largely determined by the type of activity in which the subject is involved in order to cope with the "threat". If emotional stress in physiological terms is manifested by the reorganization of the internal state of the organism in order to preserve the normal conditions of its functioning and impact on the outside world, if emotion is as if between the two main spheres of life of the organism - metabolism and interaction with the environment, then vegetative processes cannot be separated from all other processes occurring in the organism. And only in this aspect the question of vegetative correlates of stress can be considered, not "vegetative correlates" in general, but vegetative shifts accompanying these or those states, actions or their consequences in a certain phase of development of emotional-stress reaction.

In all periods of development, formation and expression of emotional tension or emotional-stress reaction there is a certain dynamic of vegetative processes. Some indicators are labile,

others require more time for development. It is possible to distinguish vegetative shifts that accompany the processes of emotional shift, expression of emotion, psychological adaptation, emotional-behavioral reaction. Therefore, in relation to the dynamics of the emotional- behavioral process, even before the development of typical behavioral phenomena, a complex of vegetative shifts is formed and manifested. The vegetative reaction is ahead of the motor reaction and is formed together with the phantom of the future result of the action, therefore, in the state of fear, the response can be very different, depending on whether an active- (escape) or passive- defensive (freeze) reaction follows. During the period of execution of the behavioral response caused by acute emotional-stress influence, autonomic shifts are conditioned and connected mainly with motor processes, their consequences, metabolic reactions, and homeostasis processes. They lose their specificity and can be completely similar to the vegetative manifestations observed during similar actions of non-emotional origin. Thus, the nature of vegetative manifestations under emotional stress is largely determined by the nature of the protective process.

In this connection the question arises to what extent biologically expedient complexes of vegetative and somatic manifestations of emotional-stress reactions are functionally transformed, how specific are stereotyped vegetative reactions inherent to different types of emotional states [9]. The causal factor of variations in response reactions is the individual himself, with his predisposition to react to a stress situation in a certain way - the concept of reactive stereotypy, according to which one individual will, for example, constantly react to the same situation by increasing blood pressure and tachycardia, and another - by increasing the rhythm of heart contractions and decreasing blood pressure. Such individual specificity of response, predisposition to typified responses may be congenital or acquired.

Behavioral change under stress is a more integral indicator of the nature of the response to the impact than separate biochemical or physiological parameters. In its most general form, behavior under stress shifts to the extremes of the excitation-inhibition scale. More often the form of behavior with increased excitability and general sensitivity, expressed in disorganization of behavior, loss of a number of previously developed reactions, tremor, mydriasis, violation of respiratory rate and heart rate rhythm, weakening of control over autonomic reactions, blood pressure fluctuations, etc., dominates. Reactions of inhibitory type develop less frequently. In sharp violations of mental adaptation - up to complete cessation of all activity, such as cataleptic immobility. Under stress, behavior with predominance of stereotypy is also characteristic: responses are not adequate to the general situation, have no adaptive value [10]. At more moderate degrees of emotional stress behavioral changes concern the violation of learning processes, violation of psychomotor coordination. The quality of perception, complex forms of purposeful activity, its planning and evaluation suffer. The role of personality type in the character of response behavior under emotionally stressful conditions is very significant; in extreme conditions, impulsive personalities have a tendency to inhibition of external reaction and strengthening of vegetative reaction, to increase in the level

of catecholamines, especially in significant situations [11]. Expansive personalities have strongly pronounced both external and internal reactions, which corresponds to their tendency to externalize their experiences.

Thus, the emotional-stress reaction as a holistic somatic vegetative reaction of a certain biological orientation can be properly evaluated only from the standpoint of holistic regulation of a given individual organism.

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