

An integrated approach to assessing students' emotional stability under the COVID-19 pandemic

Iryna Arshava *, Department of General Psychology and Pathopsychology, Oles Honchar Dnipro National
University, 72 Gagarin Av, 49050 Dnipro, Ukraine

Eleonora Nosenko, Department of Educational and Developmental Psychology, Oles Honchar Dnipro National
University, 72 Gagarin Av, 49050 Dnipro, Ukraine

Kostiantyn Kutovyy, Department of General Psychology and Pathopsychology, Oles Honchar Dnipro National
University, 72 Gagarin Av, 49050 Dnipro, Ukraine

Inna Arshava, Department of Social Psychology, Oles Honchar Dnipro National University, 72 Gagarin Av, 49050
Dnipro, Ukraine

Suggested Citation:

Iryna, A., Eleonora, N., Kostiantyn, K. & Inna, A. (2020). An integrated approach to assessing the students' emotional stability under COVID-19 pandemic. *New Trends and Issues Proceedings on Humanities and Social Sciences*. 7(3), pp 184–191. Available from: www.prosoc.eu

Received from July 12, 2020; revised from August 21, 2020; accepted from November 12, 2020.

Selection and peer review under responsibility of Prof. Dr. Huseyin Uzunboylu, Higher Education Planning, Supervision, Accreditation and Coordination Board, Cyprus.

©2020 Birlesik Dunya Yenilik Arastırma ve Yayıncılık Merkezi. All rights reserved.

Abstract

In contemporary unpredictably threatening environmental conditions, many students, like individuals of other walks of life who realise the potential danger of corona virus disease for their health and even life, are likely to experience higher than usual levels of emotional stress and consequent behavioural changes, like proneness to self-handicapping, escapism, giving preference to avoidance-type of coping strategies etc. This article presents the description and the expediency of using, for the monitoring of the emotional states of the students, a computer-assisted technique for assessing the mode of information processing preferred by the individual in the stressful conditions. The unified holistic-synthetic mode is found to be pertinent to emotionally stable individuals and consecutive analytical ones compared to the emotional vulnerable ones. The technique can be used for monitoring the emotional states of students and accounting for them in the process of teaching.

Keywords: Emotional stability, cognitive processes, strategy of informational processes, consecutive analytical, holistic-synthetic mode.

* ADDRESS FOR CORRESPONDENCE: **Arshava Inna**, Department of Social Psychology, Oles Honchar Dnipro National University, 72 Gagarin Av, 49050 Dnipro, Ukraine.

E-mail address: arshinna@i.ua

1. Introduction

In the present favourable environmental conditions, caused by the corona virus disease (COVID-19) pandemic, the subjects of higher education acquisition were likely to experience higher than usual levels of emotional stress. This kind of stress has been known since long to tell negatively on the efficacy of all cognitive processes, memory in particular. It is common knowledge how vulnerable to emotional stress is the short-term memory of an individual experiencing stress, the average capacity of which is limited by the so called 'magic number 7' (7 ± 2 discrete units).

The fluency of speech of individuals who experience high levels of emotional stress is also characterised by some peculiarities: the increase in the unit of frequency of various types of hesitation phenomena— pauses, semantically irrelevant repeats, the so called 'false starts', slips of the tongue and the like (Nosenko, 1981).

Although many of the consequences of emotional states, experienced by the subjects of knowledge acquisition, for their success in learning had been earlier described by psychologists, including the authors of this article (Nosenko & Arshava, 2006), there has been no unified efficacious method of their assessment. The events of the COVID-19 pandemic stimulated us to generalise in this article the various aspects of the likely negative impact of the emotional stress for the emotional states of the subjects of higher education acquisition and even on their disposition traits and adapt an earlier patented invention (Arshava, Nosenko & Khizha, 2010) for monitoring the states of learners regularly with the help of the computer-assisted technique the likely changes in the dynamics of the cognitive processes under stress and monitor the emotional stability of the learners in the present highly stressful conditions of studies.

With the help of the quite attainable, as it seems, a set of cognitive assignments, which we ascribed to the so called 'failure stress', was modelled artificially in one of the three series of assignments presented in succession. Now, it has become clear that emotional stress can impair cognitive functioning drastically and should be given due attention to the cause of instruction than before.

Only 25%–30% of the students managed to carry out cognitive functions without mistakes, and attributed them to the specially designed conditions stimulating 'failure stress', which is hardly possible. So, a new look into this problem is required and more attention should be paid to 'failure stress'.

1.1. In-depth relationships between cognitive processes and emotional states of individuals

In the earlier research, related to the subject-matter of this article (Arshava & Nosenko, 2008), emotional stability vs vulnerability to stress was studied as a unified system of intellectual and behavioural manifestations of the individuals, in the conditions of different forms of human cognitive functioning. For instance, it was found that sportsmen at different stages of their participation in sporting competitions demonstrated the decrease in their oral memory (capacity) in the periods of experiencing high levels of emotional stress (Chebykin & Abolin, 1984). At the same time, there is data which show that the memory for the orally perceived information improved when the emotional excitement decreased. It is also reasonable to take into account, in this context, that under a moderate level of emotional activation, memory characteristics are likely to be improved.

The experiments memorising separate words in the state of anxiety, connected with the anticipation of the important testing, showed (Nosenko & Arshava, 2006), that anxiety stimulated forgetting verbal information, but remembering the signals of alarm. So, the emotional states of the individuals, as a rule, negatively tell on the efficacy of their cognitive processes and particularly memory. This effect specified depends on the personality traits as well.

Personality traits have also (Reykovsky, 1979) aimed to differently affect the efficacy of the acts of memorisation. Thus, the adequate correlations between emotions and memory can be established on

the personality dispositional level as well. That is why for assessing and monitoring the emotional stability vs vulnerability of the groups subjects of knowledge acquisition, memory can be regarded as the key cognitive process, which is intimately connected with anxiety in its two major forms of manifestation: situational (as a state) and dispositional (as a trait).

There is enough empirical data which prove that individuals, who are prone to experience anxiety, might even manifest the state of the so called 'functional amnesia' (Nosenko & Arshava, 2006), which entails the growth of interference with the reduction in the speed and quality of recollection of the information retained in the memory.

That is why one can consider the emotional stress to be an 'alter ego' of their emotional vulnerability, while the maintenance of the state of 'optimal functioning', when the stressor appears, as the form of manifestation of the emotional stability.

Emotionally stable individuals are characterised by the lower levels of neuroticism and anxiety, and by higher extraversion and internality, while emotionally unstable individuals are likely to possess higher levels of neuroticism and anxiety, introversion and externality.

For differentiating various types of psychic states, determined by different dispositional and dynamic traits of the personality, the concepts of the negative (unstable) states and optimal (stable) states are used. Negative psychic states are characterised as the states that are not favourable for activity, that weaken the health, determine conflicts, function as psychological defence mechanisms and are surely unadaptive. A two-factor model was used for describing the interrelationship between the impacts of changes on the functional state of the individual as the indicants of the efficacy of one's activity in extreme situations. The existing methods of diagnostics of emotional stability are based on this approach analysed by Chebyk in and Abolin (1984), with reference to the sporting activity (Chebykin & Abolin, 1984).

Emotional stability was analysed rather as a state than as a personality trait (Nosenko & Arshava, 2006). In accordance with this approach, the modelled forms of activities very closely imitate the conditions of real professional activities.

The authors, who investigated emotional stability in the paradigm 'personality–state–activity' (Lomov, 1975, etc.), claimed that extreme conditions can make an impact on the subject of the activity, either as the stimulators of the activity or as destructors. The adequate behaviour is associated with emotional stability, and the inadequate, unpredictable behaviour is associated with emotional instability.

The data as to the mechanism of the interrelation between emotions and memory have been obtained in the laboratory conditions by using special methods of stimulating the brain structures, related to emotional responding. The results mentioned above reviewed the role of investigating emotional stress and memory functioning which showed that there is an in-depth relationship with emotional instability, as both a trait and a state factor. The state of emotional tension was found to negatively impact the efficacy of the short-term memory functioning which is connected with the impairments of the so called 'trace activity' of the brain.

According to the data of other researchers (Eysenck, Derakshan, Santos & Calvo, 2007; Gustavson & Miyake, 2016; Lukasik, Waris, Soveri, Lehtonen & Laine, 2019; Moran, 2016; Sandi, 2013), there exists a negative correlation between anxiety and memory efficacy. Anxious individuals spend more efforts for overcoming anxiety, which tells negatively on the memory characteristics. Individuals with high proneness to anxiety have a lower short-term memory capacity than most emotionally stable individuals. There is research data that illustrate the relationship between memory and both the emotional state of the individual, determined by a failure in the course of activity, and their stable dispositional characteristics. In the research of MacLeod and Donnellan (1993), for instance, it was found that short-term memory capacity differs in individuals with high and low levels of dispositional

prone to anxiety. The low level of the short-term memory capacity negatively tells on the efficacy of the cognitive functioning of the individuals prone to anxiety.

As other researchers (Calvo, Ramos & Estever, 1992) claim, there is a difference in the efficacy of text comprehension in the examination situation of emotionally stable and unstable individuals. There are empirical data which confirm the impact of anxiety, as both a trait and a situationally induced state, on the working memory capacity. The data prove that the simultaneous impact of anxiety as the personality trait and anxiety as a situational state reduce the short-term memory and the working memory capacity more drastically. It was found that the characteristics of the working memory change under the impact of emotional stress of the individual, particularly in individuals with proneness to the emotional state and high level up anxiety as a trait. So, the effect is sort of 'doubled'. There are also research findings (Rapee, 1993) which prove that both personality factors of proneness to anxiety and situationally induced emotional states reduce the working memory capacity more than either factor separately. This allowed us to claim that all the manifestations of the stress effect are subjected to a unified mechanism of their determination.

1.2. Operational characteristic features of the emotional stability versus vulnerability

Individuals who are characterised as emotionally stable achieve quick restoration after the stage of the primary excitation of their optimal (working) state, while emotionally unstable individuals are likely to experience after the primary excitement stage the state of emotional tension. The state of emotional tension may be experienced in different forms.

So, we suggested (Nosenko & Arshava, 2006) operational is in gemotional stress in terms of a continuum of the following psychic states: anxiety, emotional tension, negative affect and frustration. They explain the relationships between state and personality: dynamic personality traits and stable and unstable psychic states. In light of the above-mentioned changes, the characteristics of the activity under the impacts of stress are to be studied as a form of reflection of the changes that occur in the manifestation of the psychic processes, determined by the psychic states.

That is why different focuses of the manifestation of the individual's stability under extreme conditions of functioning, such as operational stability, motor stability, sensory stability, mnemonic stability, are to be treated in the context of their common determination (Nosenko & Arshava, 2006).

Thus, if we are prepared to interpret the phenomenon of 'emotional stability' as a system of different forms of its manifestation, it is reasonable to expect that there appear wider prospects for the operationalisation of the phenomenon of 'emotional stability' of man. The researchers tried to differentiate the 'components of the reliability, namely 'professionally determined components of reliability' and 'motivational' components; the so called 'psychological components of reliability' (Firsov, 1996)

The further step towards the operationalisation of the concept of 'functional reliability' can be ascribed to the appearance of such collocations as 'stability or resistance to interference', as a characteristic feature of professionally significant functioning. The above-mentioned term was used in the field of 'psychology of labour'.

In the 1980s of the 20th century, alongside with the concept of 'stability to interferences', there appeared a wider term 'ambiguity tolerance' and concretisation of the definition of the phenomenon as a psychic property was made, primarily in the direction of studying the impact of this psychic property predominantly on the activity. That is why in collocation with the concept of 'activity' there appeared the concept of 'reliability', which means something more, then 'optimal achievement of the significant aims'. The concept of 'reliability' appeared in such collocations as reliability of work, measures taken and work, which later on was sort of concretised in the collocations of the type of 'functional reliability'. The term 'reliability' began to be used in reference to the characteristic properties of the 'subject of activity' (or the doer of the actions). Later on, the term 'stability'

appeared to be used in reference to the personality characteristic features, alongside with assigning 'reliability' to the 'subject of some responsible activity'.

In our monograph (Nosenko & Arshava, 2006), we suggested, in fact, operationalising the phenomenon of 'maintaining high level of the functional activity' in the conditions of strong interferences as 'maintaining the emotional activation on the level necessary and sufficient for keeping one's'.

As far as the interpretation of the meaning of the collocation 'emotional stability' is concerned, the majority of researchers of the problem has chosen the approach to the operationalisation of this phenomenon, which is based on studying the likely impact and the corresponding technique for its diagnostics. There is a classification of different types of the ambiguous situations; which can occur in the external conditions of labour, as well as in the everyday life activity (Krinchik, 1979). It is claimed to characterise the individual's rigidity and the so called 'inactivity'. Ambiguity is reasonably referred to as the 'stressors' or 'frustrators', which are not less significant than 'interferences'.

2. The method of assessing individual differences in cognitive functioning and information processing

To make the description of the method as brief as possible, it is sufficient to mention that the individual is requested to process while testing the procedure of a pictorially presented information – in the form of a set of simple geometrical figures: triangles, squares and circles of different sizes and colours, arranged in rows and columns on a computer screen in such a way as to create their perception, memorising the consequent reproduction sufficiently stressful conditions by varying the amount of information within the limits of the short-term memory capacity. To increase the 'information overload', the individuals are also requested to mention in the process of testing the so called individual 'callnames' that are ascribed to them for the time of testing procedure. Thus, testing somewhat resembles the procedure of the exchange of information between the pilots and the airport traffic controllers. When carrying out the first set of assignments (20 questions), the recipients had to process the amount of information which does not exceed the human short-term memory capacity. In the second set of assignments (20 questions), the amount of information to be processed is increased beyond the maximum short-term memory capacity which dooms the recipients to an unavoidable (or hardly controllable) failure, likely to elicit failure stress in the individuals susceptible to stress. In the third set of assignments (also containing 20 questions), the initial conditions of information presentation are renewed.

Mode of information processing was identified, when the speaker stuck to the following assigned order of the information arrangement, namely mentioning one's 'call name' and the call name ascribed to the imaginary 'traffic controller' who asked questions about the positions on a specially designed 'map' of the above-mentioned geometrical figures; and all the distinguishing features of the those figures (forms, sizes and colours), as well as their positions on the graphically presented scheme (ordinal number and row) etc.

After experiencing an unavoidable failure, less efficacious subjects failed to cope with the assignments presented in the third series and demonstrated a lower level of efficacy than that prior to failure, despite the fact that conditions for their fulfilment became favourable again. The vulnerability to proneness to stress vs. the emotional stability of the subjects was assessed with reference to: (1) the accuracy of perception, (2) completeness of the distinguishing characteristics of the presented information, which were reproduced and (3) observing the formal requirements to information reproduction mentioned earlier.

3. Empirical results obtained with the help of the method and their discussion

The sample included 65 participants (also predominantly females, junior students, aged 19–21 years). Since we hypothesised that the participants, who are stable to stress, unlike those susceptible to failure stress, will act in the third series of assignments as efficaciously as they did in the first series (or might even show higher standards of performance, thanks to the acquisition of the skill), we chose the following methodology for the implicit assessment of stability vs. susceptibility to stress. We clustered the sample of participants (k-means algorithm) into three clusters by the variables of their information-processing efficacy displayed in the course of fulfilment of each of the three series of assignments and then compared the between-cluster differences in their explicitly assessed personality characteristics of emotional stability vs. susceptibility to stress, using various psycho diagnostic techniques. Among them there were: State-Trait Anxiety Inventory (Spielberger, 1972), NEO Five-Factor Inventory (Costa et al., 1992, adapted by V. Orel) and Coping Inventory for Stressful Situations (Endler & Parker, 1990).

As can be seen from Table 1, the participants' data differ statistically significantly (by *t*-test) on the number of correctly identified 'call names' and 'figures' between the first and the third set of assignments. The results of the second set of assignments were not compared, since they were designed to doom the participants of clusters to failure by increasing the information load in them to exceed the short-term memory capacity.

Table 1. Between-cluster (1st vs. 3rd) differences in performance characteristics

Cognitive task performance variables in different series of assignments		Mean values		t-test
		Cluster 1 (n = 21)	Cluster 3 (n = 17)	
Call names	1 series	13.96	11.84	2.29 ^a
	3 series	14.83	7.72	14.35 ^b
Figures	1 series	13.14	11.53	2.16 ^a
	3 series	15.21	12.46	2.39 ^a

^aSignificantly different at $p < 0.05$.

^bSignificantly different at $p < 0.01$.

The results presented in Table 1 show that the participants of the first cluster correctly identified more than half of the tasks of the total number of assignments, whereas the participants of the third cluster had statistically significant differences in their cognitive-task performance efficacy.

The results presented in Table 2 show that the asymmetry indices are also statistically significantly different for representatives of opposite clusters. The asymmetry measures were calculated as the difference between the numbers of correctly identified 'call names' and 'geometric figures' in percentage. High asymmetry indicates the appearance of the psychic state of operational tension, specific to emotionally unstable subjects in conditions when they anticipate or experience the threat of failure. The results suggest that the participants of the first cluster had equally high goals to achieve efficacy in both interrelated cognitive activities, which can be claimed indicative of their higher achievement motivation and conscientiousness.

Table 2. Between-cluster (1st vs. 3rd) differences in performance characteristics

Cognitive task performance variables in different series of assignments		Mean values (%)		t-test
		Cluster 1 (n = 21)	Cluster 3 (n = 17)	
Asymmetry	1 series	4.58	21.67	-4.68 ^a
	3 series	2.15	37.49	-12.32 ^a

^aSignificant differences at $p < 0.01$.

Table 3 presents the results which illustrate statistically significant differences between the two opposite clusters in their personality characteristics, determinant of the cognitive performance differences.

Table 3. Between-cluster (1st vs. 3rd) differences in participants' personality characteristics

List of inventories and their scales	Mean values		t-test
	Cluster 1	Cluster 3	
State-trait anxiety inventory	29.82	52.37	–
Trait anxiety			9.64 ^a
State anxiety	35.54	55.23	–8.77 ^a
<i>Big five</i>			
Extraversion	46.14	25.63	4.36 ^a
Agreeableness	36.27	37.88	–0.24
Conscientiousness	38.44	28.53	2.97 ^b
Neuroticism	22.73	36.57	–7.63 ^a
Openness to a new experience	31.19	23.75	6.36 ^a
CISS			
Task-focused coping	62.83	54.67	4.32 ^a
Emotion-focused coping	47.667	54.000	–2.272 ^b
Avoidance coping	41.848	51.538	–3.08 ^a

^aSignificantly different at $p < 0.01$.

^bSignificantly different at $p < 0.05$.

As shown in Table 3, the participants of the 'opposite' clusters, formed by the method of cluster analysis on the results of their cognitive performance indices, appeared to statistically significantly differ in trait anxiety ($t = -9.64$, $p < 0.001$), state anxiety ($t = -8.77$, $p < 0.001$), neuroticism ($t = -7.63$, $p < 0.001$), extraversion ($t = 4.36$, $p < 0.01$), conscientiousness ($t = 2.97$, $p < 0.05$) and openness to a new experience ($t = 6.36$, $p < 0.001$).

Thus, cluster 1, which includes subjects with higher computer test performance, presents a larger number of individuals with low personal and situational anxiety. Significant differences were found in these indicators of anxiety between the two polar clusters.

The data in Table 3 contain an important conclusion for this study that among potentially stress-resistant individuals (who belong to cluster 1 according to the computer test), a more average indicator of the advantage of the strategy of concentration on the problem (task focused), i.e., the most productive strategy under stress conditions than in the cluster 3. There are differences between polar clusters in terms of computer diagnostic techniques and problem avoidance strategies as a means of coping. Table 3 shows that cluster 1 has the lowest average avoidance rate as a coping strategy.

4. Conclusion

The use of computer-based methods for diagnosing an individual's emotional stability according to the indicators of information-processing activity allows us to identify the features of the course of mental processes that are determined by the functional states of an individual. The operational features of the effectiveness of the simulated perceptual-mnemonic activity considered in this study, in particular those that characterise the phenomena of asymmetry, the general level of efficiency, provide reliable information for recognising differences in mental states when changing operating conditions. The test appeared to be indicative, as it seems, for assessing the individual's self-efficacy as a subject of cognitive activity, since there are statistically significant inter-groups differences on the variable of the amount of information processed by the individual within some fixed period of time. This parameter correlated positively with the emotional stability of the individual. This opens up prospects for research in this direction.

References

- Arshava, I. F. & Nosenko, E. L. (2008) *Aspects of implicit diagnosis of human emotional stability*. Dnipropetrovsk, Ukraine: DNU Publishing.
- Arshava, I. F., Nosenko, E. L. & Khizha, A. L. (2010). *Method of predicting human emotional stability*. Ukraine: Patent 91842.
- Calvo, M. G., Ramos, P. M. & Estever, A. (1992). Test anxiety and comprehension efficiency: the role of prior knowledge and working memory deficits. *Anxiety, Stress and Coping*, 5(2), 125–138.
- Chebykin, A. Ya. & Abolin, L. M. (1984). Investigation of emotional stability and psychological means of its formation in athletes. *Psychological Journal*, 4, 83–89.
- Darke, S. (1988). Anxiety and working memory. *Cognition and Emotion*, 5(20), 145–154.
- Eysenck, M., Payne, S. & Derakshan, N. (2005). Trait anxiety, visuospatial processing, and working memory. *Cognition and Emotion*, 19, 1214–1228. doi:10.1080/10615800701847823
- Eysenck, M. W., Derakshan, N., Santos, R. & Calvo, M. G. (2007). Anxiety and cognitive performance: attentional control theory. *Emotion*, 7, 336–353. doi:10.1037/1528-3542.7.2.336
- Firsov, K. V. (1996). *Mental reliability of flight personnel*. Abstract Dissertations for the degree of candidate psychology sciences. Moscow State University, Moscow, Russia.
- Gustavson, D. E. & Miyake, A. (2016). Trait worry is associated with difficulties in working memory updating. *Cognition and Emotion*, 30, 1289–1303.
- Krinchik, E. P. (1979). Psychological problems of work in the face of uncertainty. *Vestnik Moscow University*, 14(3), 14–23.
- Lomov, B. F. (1975). About a systems approach in psychology. *Questions of Psychology*, 2, 31–45.
- Lukasik, K. M., Waris, O., Soveri, A., Lehtonen, M. & Laine, M. (2019). The relationship of anxiety and stress with working memory performance in a large non-depressed sample. *Frontiers in Psychology*, 10, 4. doi:10.3389/fpsyg.2019.00004
- MacLeod, C. & Donnellan, A. M. (1993). Individual differences in anxiety and the restriction of working memory capacity. *Personality and Individual Differences*, 15(2), 163–173.
- Maloney, E. A., Sattizahn, J. R. & Beilock, S. L. (2014). Anxiety and cognition. *Wiley Interdisciplinary Reviews Cognitive Science*, 5, 403–411.
- Moran, T. P. (2016). Anxiety and working memory capacity: a meta-analysis and narrative review. *Psychological Bulletin*, 142, 831–864.
- Norton, R. (1975). Measurement of ambiguity tolerance. *Journal of Personality Assessment*, 39(6), 607–619.
- Nosenko, E. L. (1981). *Emotional state and speech*. Kyiv, Ukraine: Higher school Publishing.
- Nosenko, E. L. & Arshava, I. F. (2006). *Theoretical and psychological foundations of computer diagnostics of human emotional stability*. Dnipropetrovsk, Ukraine: DNU Publishing.
- Rapee, R. (1993). The utilization of working memory by worry. *Behavioral Research and Therapy*, 31, 517–620.
- Reykovsky, I. (1979). *Experimental psychology of emotions*. Moscow, Russia: Progress Publishing.
- Sandi, C. (2013). Stress and cognition. *Wiley Interdisciplinary Reviews Cognitive Science*, 4, 245–61. doi:10.1002/wcs.1222
- Wu, J. & Yan, J. (2017). Stress and cognition. *Frontiers in psychology*, 8, 970. doi:10.3389/fpsyg.2017.00970