

## **E-Learning Application for Prevention, Detection and Therapy of Posttraumatic Stress Disorder**

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### **Abstract**

*In 2014 the amount of people suffering from posttraumatic stress disorder in Ukraine significantly increased due to Antiterrorist Operation in Ukraine. It provoked the search of new methods of prevention, detection and therapy of posttraumatic stress disorder. In this paper, during the e-learning process with the specially designed indicators system, we prevent, detect and treat disorder on subconscious level. We will discuss the possibilities of implementation and use of e-learning courses from different disciplines and use of indicator system, application of e-learning course for sociological researches.*

**Keywords:** Advanced Distributed Learning, indicator, posttraumatic stress disorder, e-learning course

### **1. Introduction**

Post-traumatic stress disorder (PTSD) was recognized after the Vietnam War in 1980 (Figley 2006), although stress disorder took place during all wars. Vietnam War served as a powerful stimulus to American psychiatrists` and psychologists` researches. According to statistics after returning from the war three times more veterans committed suicide than died. In 1980, scientist M. Horovits identified post-traumatic stress disorder (PTSD) as a separate nosological form of mental disorder. PTSD is a form of mental disorder caused by traumatic events, stressful situations that may provoke irritation, anger outbursts, depression, and in cases of the acute disease - suicide. The informatization of society and the degree of destructive influences through the media for the participants of combat operations led to a significant strengthening and aggravation of PTSD. Post-traumatic syndrome was aggravated by negatively depressing stories on television, radio, print and electronic media. Moreover, as shown by the research, the effects on the subjects of cyber-communication, in some cases, synergetically reinforce the negative impact of the media bringing occurrences of PTSD to a new level.

### **2. PTSD Treatment Experience**

According to the information represented by Ukrainian TV-channel "One plus One" (2015), since the beginning of the antiterrorist operation (ATO) in 2014 year, 80% of the ATO participants in Ukraine suffered from PTSD. In order to overcome the negative consequences of PTSD in a number of regional centers of Ukraine (Lviv, Lutsk, Kyiv), volunteers established psychological rehabilitation centers. The centers provided prevention of PTSD before sending troops to combat zones: the testing for identifying the individual psychological characteristics, the analysis of the results, in the form of consultation talks with a psychologist.

However, the problem didn't achieve systemic solution in a quantitative or qualitative aspects. First and foremost, the main focus was on verbal methods and assessments. According to the research results of the Institute of Medicine of the National Academy of Sciences (2012) (Figley 2006, Nebraska Department of Veterans Affairs), detecting of non-verbal characteristics of the individual mental state helps to avoid the effects of subjective factors (the veracity of the responses during testing, the true emotions concealment, the impact of the environment on individual opinions, etc. ). Moreover, work with military personnel is underway before the departure to or in the combat area, either after servicemen's return. In the process of PTSD genesis and developing, such activities are not conducted. As experts for the PTSD prevention and treatment in the units of combat area, as a rule, are missing. Experience of treatment PTSD of Iraq and Afghanistan war veterans with the help of virtual exposure therapy in the United States, where various training courses were conducted (Roy 2005), confirms that education has a therapeutic effect in the PTSD treatment. But in the current practice of carrying out therapy is usually performed after the syndrome was formed and strengthened. At the same time, the data analysis on the PTSD genesis and development indicates that the most dangerous stage of the stress disorder is a moment of its initiation.

### **3. Methodology**

Authors found a number of indicators characterizing changes in the psycho-emotional state of the individuals in the process of information exchange in a distance with military personnel of the units in the combat area. The confirmation of the positive impact of the various spontaneously arising distracting verbal and nonverbal factors during the execution of tasks was received. There is a correlation between the arising distracting verbal and nonverbal factors during the task execution process and those effects that are currently used for the treatment of PTSD. It contributed a suggestion to form the appropriate conditions for personnel testing and therapeutic effect on it in the process of Advanced Distributed Learning (e-learning/electronic learning/ADL). It considered also that all known methods of PTSD prevention and treatment based on the distracting factor (Tull 2015), focusing on other aspects of person's activities which require high concentration and is time consuming. The stronger the passion of a person, the less the person will remember traumatic or unpleasant experiences. Distracting factors can be: art, work, study or any other hobbies that create a high level of motivation and require concentration. Concerning that studying, in contrast to other distracting factors, uses sensory systems for perceiving didactic material, we can conclude that the involvement of the majority of human sensory systems contributes a high level of concentration. During the research the authors found that distractions for the PTSD prevention and treatment of soldiers in a combat area are:

- A conscious choice in the learning process (choice of topic, tasks, etc.);
- The learning process as a topic for discussion with comrades;
- Training (studying) as a distraction from the bad habits;
- Person's training (studying) as an example for following to other soldiers;
- Creating a positive perception of the environment and a high level of motivation during training.

There are many methods for PTSD treatment, but the methods of prevention, early detection and therapy in the process of its formation, moreover, at the place where it is forming, are almost absent. Therefore, the aim of the research was to develop methods of PTSD detection and diagnosis by indirect indicators, prevention and treatment of PTSD in the process of e-learning through the formation of obsessing and distracting effects.

#### **3.1. PTSD Preventing and Treatment Methods in the Process of E-learning**

The prevention, detection and treatment of PTSD in the process of Advanced Distributed Learning required designing a special algorithm for the functioning of e-learning course. During the research process a correlation was found between the response to the content of the didactic material and a psychological state of a person based on students' choice of the content of didactic material, the selection of topics for studying, choice of colors, tests design, etc.

##### **a) Voice Indicator**

The analysis of non-verbal communication by Australian scientists confirmed the effectual usage of voice characteristics for the analysis of the individual psychological state (Sheerman 2011). Regarding the research experience, it was concluded that the stress disorder is characterized by the following voice features:

- Tone (tone of voice frequency increases or decreases with respect to certain rules at any PTSD occurrences);
- Volume (volume level is reduced, especially at appearance of stimuli that provoke PTSD symptoms);
- Intensity of the voice (the intensity level decreases from baseline).

The analysis of all voice components must be complex and automated concerning the research experience.

#### **b) Color Indicator**

Taking into consideration the possible technical difficulties in transmitting data via telecommunication networks a lot of attention was paid to the exploration of the relationship between PTSD symptoms and preferences in colors based on the Luscher modified test (Luscher 1970, Bobic 2007). It gave an opportunity to diagnose PTSD symptoms on the early stages. Also, it helps to identify person's addictions to certain symptoms in the future. Using the experience of determining the emotional aspects by the Luscher modified test established the correspondence between dominant colors selection in the photo, picture and PTSD symptoms (e.g. choice of dark blue color corresponds to the passive state of a person, the PTSD symptoms of avoidance). Selecting the design of didactic materials, tests with the dominance of certain colors identifies the PTSD symptoms of a serviceman.

#### **c) Semantic Indicator**

Authors on the basis of Paul Ekman results of the research (2005) suggested the use of lexical and semantic language features to determine person's emotional state. Considering emotions as a main factor in determining the principal PTSD symptoms, the choice of grammatical and lexical structures is one of the methods for detecting stress disorder. An analysis of lexical and grammatical structures defines person's emotional state, which is one of the main factors to determine the PTSD symptoms. Regarding emotions as a principal indicator in the lexical-semantic analysis for preventing and detecting PTSD, the relationship of lexical and grammatical structures was established for their transformation into information data by the system. Complex analysis of the information data enables us to establish the presence or absence of PTSD symptoms. The analysis of lexical and grammatical structures as PTSD indicators showed that mental disorders contribute the usage of lexical and grammatical structures of negative semantic shade of meaning.

Based on the experience of the research on the PTSD detection and diagnosis by the lexical and semantic features, it is effectually to use Text Assessment Programs. Text Assessment Programs transform unstructured lexical and grammatical structures in the information data for further analysis. The analysis contributes a distribution of lexical and grammatical structures into two categories - the absence / presence of PTSD (PTSD / NONPTSD). Experience of Text Assessment Programs usage (Tauszik, Pennebaker 2010) indicates that it is necessary to analyze the lexical and grammatical structures in two ways: the analysis of the lexeme (not including derivatives of words to avoid ambiguity), the analysis of syntagma, which involves semantic relationship between words. Determination of PTSD symptoms by analyzing the use of lexical and grammatical structures required the design of the e-learning course. The lexical and grammatical structures of didactic material of the electronic course will correspond to the specific symptoms of PTSD. Telepsychiatry experience in the diagnosis and treatment of mental disorders shows the effectiveness of indirect indicators involvement (World Health Organization 2009). But it is also necessary to note the role of mental defense mechanisms that can hide via conscious actions real emotional state, and indicators or PTSD symptoms. To solve this problem it is advisable to use studying as a factor of concentration involving human sensory systems for effective educational process and analysis of subconscious verbal and nonverbal indicators for the PTSD diagnosis and treatment. Concerning emotions as the main indicator of the person's mental state and their occurrences on the various external stimuli, it is required to create an algorithm. The analysis of indirect indicators will be based on the selection of parameters (color, form, content, etc.). The indicators will perform the role of stimuli for PTSD symptoms. During task execution, depending on the stage of PTSD development, students tend to selecting relevant topics colors, geometric shapes, lexical and grammatical structures subconsciously. In selecting the theme and content of the e-learning course, it is carried out an analysis of the positive or negative semantic shade of meaning of topics content.

#### **d) Geometric Shapes Indicator**

Analysis of geometric shapes selection is conducted according S. Dellinger test (2013). The test determines the character traits, preferences, skills and signs of stress (e.g. selection of the square indicates the stubbornness, but hard-working, patient and conservative nature, stress disorder makes squares very active in communication, irritable, lacking organizational skills, etc.). Traits of a character define personal approach to studying.

That's why it is necessary to create individual exercise complexes unified under the type of temperament (the sanguine, melancholic, choleric, phlegmatic).

#### **e) Physiognomic Indicator**

There were also conducted researches of the possibility and effectiveness of methods developed in full or in part depending on the technical characteristics of information and communication networks. Having the throughput (bandwidth) not less than 35 kBt / s (Pane 2005) makes reasonable to analyze the voice data. But it is necessary to regard that the voice indexes (indicators) doesn't show specific PTSD symptoms. That's why alternatively or in complex having bandwidth not less than 70 kBt / s (Freeman 2007, Pane 2005), we may conduct a physiognomic features analysis. Analysis physiognomy allows detecting the genesis and development of PTSD symptoms, as some of the emotional states of a person (defined by physiognomic features) correspond to PTSD symptoms. Analysis of physiognomic indicators concerns the movement of the eyes, nose, mouth (e.g. anger, rage - gloomy, reduced to the nose eyebrows). The presence of the Internet network makes it possible to communicate in the blogosphere, which is also effective to analyze not only by used lexical and grammatical structures on forums but also by emoticons that reflect specific human emotions, which are the basis for PTSD symptoms detection. The design of concrete exercise complex in e-learning course depends on the specifics of the course (Lorenz 2014) and identified the PTSD indicators, symptoms. Didactic theoretical and practical material should include audio, video, images (pictures, photos, etc.), and text documents for the analysis of human sensory systems. The prevention and detection of PTSD by indirect indicators is based on the analysis of human sensory systems. Individualization of the educational process occurs through the choice of corresponding exercise complex of the e-learning course by the system, taking into consideration individual psychological characteristics of a person (defined by Indicator System), level of language knowledge and mistakes made by the person during educational process or testing.

#### **4. Conclusion**

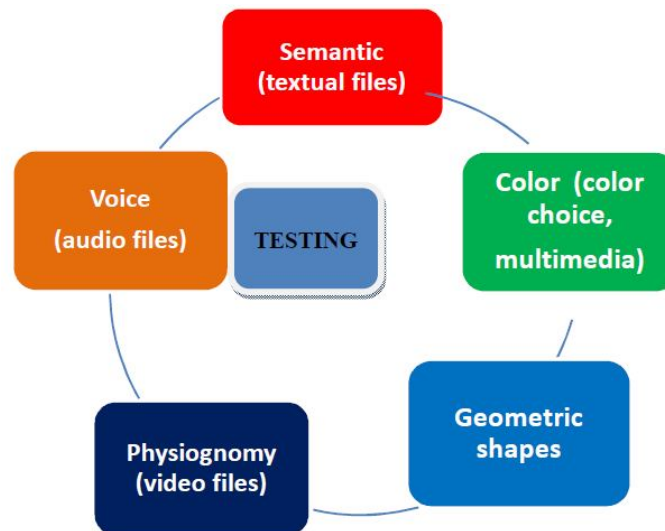
The use of distance learning for the prevention and treatment of PTSD makes it possible to detect, treat stress disorder on the early stages and prevent the appearance of symptoms, using the learning process as a distraction to avoid the defense mechanisms of the human psyche. In the condition of Ukraine integration into the European and world system of international cooperation with the countries of NATO and the European Union, foreign language learning has become essential. International cooperation programs (e.g. DEEP, «Partnership for Peace», etc.) require a good command of a foreign language for a military by the standards of STANAG 6001. That's why e-learning course is designed in a foreign language with the possibilities of prevention, detection and treatment of PTSD. However, in the learning process the identification of unbiased real student's opinion and his attitude to NATO, political situations and many other important issues are possible. A thought-out design of the e-learning course with the necessary texts, exercises, audio and video materials will allow to influence the formation of such opinion and implement its correction if necessary. The implementation of e-learning courses in other disciplines is also possible. It is necessary to concern the technical characteristics of Advanced Distributed Learning: the bandwidth compression methods in the process of information digital data transmission, the quality of the received data for the analysis of indirect indicators for PTSD prevention and detection. It is suggested to apply e-learning to solve the problem of prevention, detection and therapy of Posttraumatic Stress Disorder for the first time. The application of Advanced Distributed Learning for Prevention, Detection and Therapy of Posttraumatic Stress Disorder method contrasts to other known methods by the absence of influence on the result of subjective person's feelings, when student doesn't know the objective of the research. The use of distance e-learning for the prevention and treatment of PTSD will allow to significantly reducing the negative, destructive occurrences of PTSD on the early stages of its formation and development.

**Table 1: Verbal Indicators System**

Language Peculiarities	Symptoms	Example
Word of uncertainty	Anxiety	Guess, maybe, perhaps
Causal words	Recovery	because, hence
Pronouns: 1 person singular 2 person 3 person singular	Emotional and physical pain Panic attacks associated with agoraphobia Tension, irritability	I You, He, she, it
Verbs: Past Simple Tense Future Simple Tense Present Simple Tense	Negative memories, depression Getting rid of the symptoms or their absence	Distroyed, closed, lived.. Will go, will do, will arrive...
Demonstrative Pronouns	Irritability, outbursts of anger	These, those...
Social and Emotional speech	Getting rid of the symptoms or their absence	Perfect, sweet, to love, to adore
Action Words	Getting rid of the symptoms or their absence	Go, arrive, move..
The neutral words and expressions	Depressive emotional state	So so, it happens, sometimes

Source: Authors` own elaboration

**Figure 1: Indicator System**



Source: Authors` own elaboration

## 5. References

- Matthew Tull, (2014), About Health: Using Distraction as a Way of Coping with Emotions. [Online] Available: <http://ptsd.about.com/od/selfhelp/qt/distraction.htm> (July 27, 2015)
- Bruce Stec, Shon Tomblin, Alberto Coustasse (2013). Telepsychiatry in the 21 Century: Transforming Healthcare with Technology. Research journal Perspectives in Health Information Management. [Online] Available: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3709879/> (July 27, 2015)
- Charles R. Figley, William P. Nash, Routledge Psychological Book Series, Combat Stress Injury Theory, Research, and Management, 2006, p.482.
- Institute of Medicine of the National Academy of Sciences (June 2012), Treatment for Posttraumatic Stress Disorder in Military and Veteran Populations: Initial assessment, Washington, DC: The National Academies Press, p.415, [Online], Available: [www.iom.edu](http://www.iom.edu) (July 27, 2015)
- Jasminka BOBIĆ, Lukrecija Pavićević, Milica Gomzi (2007), Institute for Medical "Research and Occupational Health, Post-traumatic Stress Disorder and Colour Preference in Released Prisoners of War", Studia Psychologica, vol.49, №3, pp.223-232.
- John Freeman and Technical Information Service, Theory of Constraints and Throughput Accounting, Topic Gateway series №26, 2007, p.10.
- John F. Pane, Leland Joe (2005), Making Better Use of Bandwidth: Data Compression and Network Management Technologies, prepared for the United States Army, Arroyo Center, p.38
- Lüscher M., Scott J., 1969, The Lüscher Color Test. New York: Random House, publisher: Jonathan Cape Ltd, 1st edition, 1970, pp.185.
- Nebraska Department of Veterans Affairs, Post traumatic Stress Disorder, [Online] Available: <http://www.ptsd.ne.gov/what-is-ptsd.html>, <http://www.ptsd.ne.gov/publications/military-deployment-task-force-report.pdf>, <http://www.ptsd.ne.gov/publications/MENG-veterans-study-full-report.pdf> (July 27, 2015)
- Paul Ekman, Erika I. Rosenberg, What the Face Reveals: Basic and applied Studies of Spontaneous Expression Using the Facial Action Coding System (FACS), second edition, Oxford University Press, 2005, 639 pp..
- Roy.M. (Ed.). (2005), NATO Advanced Research Workshop on Novel Approaches to the Diagnosis and Treatment of Posttraumatic Stress Disorder, IOS Press, Washington D.C., 235-250.
- Tim Sheerman, Eng-Jon Ong, Richard Bowden, CVSSP (2011), University of Surrey, Guildford, Feature Selection of Facial Displays of Non Verbal Communication in Natural Conversation, Surrey GU2 7XH, United Kingdom. IEEE International Conference on Computer Vision Workshops (ICCV Workshops) p.8
- World Health Organization, Telemedicine: Opportunities and Developments in Member States: Report on the Second Global Survey on eHealth, volume 2, 2009, p.93.
- YlaR. Tausczik, James W. Pennebaker (2010), Department of Psychology, University of Texas, The Psychological Meaning of Words: LIWC and Computerized Text Analysis Methods, Journal of Language and Social Psychology, SAGE publication, 24-54, [Online] Available: <http://jls.sagepub.com>, (July 27, 2015)
- Roman Lorens, Nowe Technologie w Edukacji, wydawnictwo Szkolne PWN Sp. Z o.o., Warszawa – Bielsko-Biala, 2014, s.192.
- Susan Dellinger (2013), Psycho-geometrics: The Science of Understanding People, And the Art of Communicating with Them Audio, Cassette – Abridged, Audiobook
- Ukrainian TV-channel "One Plus One" (2015), [Online] Available: <http://tsn.ua/ukrayina/sered-biy-civ-ato-shiritsya-noviy-donbaskiy-sindromom-yakiy-mozhe-prizvesti-do-epidemiyi-samogubstv-392067.html>. (July 28, 2015)