

Section: Modern PPT practice

APPLICATION OF VR-TECHNOLOGY METHODS IN PSYCHOLOGY AND PSYCHOTHERAPY



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Abstract

We shall consider the possibility of using virtual reality (VR) technologies in the treatment of phobias, psychosomatic disorders, and other psychophysical conditions. The challenge of augmenting patients' mental treatment by means of VR technologies is quite relevant in the field of psychology. A new way is quickly developing in the search for better methods of diagnosis, amelioration of anxiety and other conditions, as well as the identification of human characteristics. This new method can be characterized as deep immersion in virtual reality. This provides an opportunity to work with psychosomatics and phobias through virtual reality.

Keywords: virtual reality, psychotherapy, positive psychotherapy, emotional states, VR technologies, psychophysiological states, psychosomatics, phobias, fears

Introduction

VR technologies have become increasingly popular in recent years. Some predict a major role for them in the future of mankind, but so far, we are only at the beginning of this path. This topic is very extensive and there are many unknown aspects. First, we are interested in how this phenomenon affects the human psyche and physiology and how to derive practical benefits from this. First, in the context of psychotherapy. These technologies can become a means to help treat negative mental states (Koteneva, 2016). That is why we define the purpose of our study as the use of virtual reality technologies in the framework of psychotherapy and for the development of intellectual abilities.

The specifics of the impact of virtual reality on human physiology is due to the influence of VR on the psyche. Under the influence of VR on the senses, a person is almost completely immersed in the created virtual model and interacts with the new system at the level of audiovisual images and representations, supported by response motor reactions of the body

(Brylevskaya, 2009). VR technologies can create a stable perception of virtual reality as being true. This happens regardless of whether the brain "understands" it or not. Of course, the dissonance in the perception of realities generally has unpleasant consequences at first. Numerous studies and observations have shown that the human psyche, as well as the physical body, are extremely adaptive and able to adapt to almost any environmental conditions (Becker & North, 1998; Wallach et. al., 2006). Thus, virtual reality with deep immersion becomes only a new and different state of the surrounding world, to which psychophysical adaptation is real. Accordingly, the psyche will be able to switch between realities quite easily, adapting in the shortest period, without any negative manifestations.

"More and more people suffer from an ever-increasing number of phobias - those conditions of fear that are closely related to living beings or objects, places or time" (Peseschkian, 2016).

In medicine and psychology, psychosomatics is considered as the main influence of psychological (mainly psychogenic) factors on

the occurrence and subsequent dynamics of somatic diseases and is based on the terms "psychosomatic" (Heinroth, 1818) and "somatopsychic" (M. Yakoby, 1822) (in Malkina-Pykh 2008). This term reflects the understanding of the relationship between soul and body, in the context of an understanding broader than traditional medicine and psychoanalysis and requires consideration of the patients' transcultural and cultural-religious characteristics. Starting with Freud, the psychoanalytic concept assumes that an emotional reaction, expressed in the form of longing and constant anxiety, neuro-vegetative-endocrine changes, and a characteristic feeling of fear, is a connecting link between the psychological and somatic spheres. Thus, psychosomatic diseases include health disorders, the etiopathogenesis of which is genuine somatization experience, that is, somatization without psychological protection, when physical health is damaged while protecting mental balance (Malkina-Pykh, 2008 p. 8).

One of the objectives of our study was to investigate the possibility of a significant psychotherapeutic effect of specialized VR programs and its use as an effective tool in psychotherapy. Three blocks of research were carried out using immersion of the subjects in the environment of virtual reality and psychological diagnostic methods. In the first block, the manifestation of reactions and behavior of people in extreme virtual conditions was studied. During its implementation, we were interested in the pattern between the increase in the danger of passing and the increase in the caution and thoughtfulness of the actions of the subjects. Also, observations were made on changes in the parameters of the primary psychophysical state of the subjects, such as: blood pressure and heart rate. In the second block of experiments, the influence of non-extreme, relaxing stories on the emotional sphere was studied. Virtual aquariums, sea surf, pristine prairies produced a calming effect on the subjects. Visual stories organically complemented the corresponding acoustic effects. In the third block, a longitudinal method was used - alternate exposure to an extreme situation and a relaxing one.

This approach is seen, first, as an effective tool for psychotherapy or research in the field of psychology, psychiatry, and physiology.

The Purpose of the Study - is the possibility of implementing virtual reality (VR) technologies for psychotherapy and psychological research.

Methods: system analysis, generalization, observation, diagnostic methods, data grouping, mental state assessment, self-assessment.

Methodology

We conducted several of our own experiments in the virtual reality laboratory of our partner ARVI VR Inc. (USA) in 2017. Three blocks of research were carried out using deep immersion of the subjects in the virtual reality environment and psychological diagnostic methods. The experiments involved 2 groups of physically healthy men and women (10 people in each group) aged 23 to 30 years in equal proportion. All of them were tested with a questionnaire developed by Y. Shcherbatykh and E. Ivleva: "Questionnaire for the hierarchical structure of actual personal fears" (Scherbatykh, 2002). The first group of 10 people corresponded to the indicators of a low level of acrophobia (1-3) and the second group (10 people) of an increased level (4-6). At the same time, the average integral indicator of fear among the subjects was in the range: for men - 77-83 points, for women - 103-107 points.

The first block of experiments was aimed at studying the manifestation of reactions and behavior of people in extreme virtual conditions. The subjects were on specially equipped sites and wearing virtual reality helmets. They had to overcome a certain section of the block bridge, suspended at a great height. The experiment consisted of several stages, with a tendency to increase the complexity of passage in the form of a change in the height of the bridge and the topography of its surface. During its implementation, a pattern was revealed between an increase in the danger of passing and an increase in the caution and thoughtfulness of the subjects' actions. A primary psychological portrait was compiled for each participant according to the Sixteen Personality Factor Questionnaire (16PF), which was then correlated with the results of their behavior in the test. The main qualities of the subjects correlated with their behavior and decisions in the context of passing the test.

The duration of the test was 5-7 minutes for each subject. The dynamics of changes in blood pressure and heart rate were recorded.

Research progress and results

Below are tables with data on blood pressure and heart rate of the subjects before, during and after each block of experiments.

Table 1. Dynamics of changes in blood pressure and pulse before the start of the experiment of block 1, immediately after and after 15 minutes (average)

Experiment conditions	Systolic pressure	Diastolic pressure	Pulse
Before the beginning	118,88	75,11	70,22
Immediately after the beginning	137,16	90,13	104,36
After 15 minutes	122,06	82,24	78,74

In the same block of the experiment, changes in the psychophysical state of the subjects were recorded, such as: increased blood pressure, increased heart rate, slight dizziness, and nausea. This state, in addition to nausea and dizziness, persisted from 5 to 15 minutes after the completion of immersion in virtual reality.

As a result of the first block of experiments, an obvious possibility of studying the psychological characteristics and character of a person, as well as their treatment through certain virtual reality programs, was revealed. In VR conditions, it is possible to diagnose a person's anxiety states, his fears and weaknesses, and more accurately select therapy methods using specialized programs of the same virtual reality.

In the second block of experiments, the influence of non-extreme, relaxing stories on the emotional sphere was studied. 10 minutes per person were allotted for immersion in virtual reality with relaxing scenes.

It was found that positive, relaxing virtual pictures with "live" landscapes and environments enhance positive emotions and have a calming and inspiring effect on a person. However, there was a clear correlation with the subject's temperament.

Table 2. Dynamics of changes in blood pressure and pulse before the start of the experiment 2 blocks, immediately after and after 15 minutes (average)

Experiment conditions	Systolic pressure	Diastolic pressure	Pulse
Before the beginning	119,76	77,34	72,37
Immediately after the beginning	122,26	80,19	88,19
After 15 minutes	120,12	80,86	76,61

In the third block, the longitudinal method was used (alternating exposure to an extreme situation and a relaxing one). This took 15 minutes per person. The alternation of an exciting and meditative situation in the virtual space showed a more rapid decrease in tension and fatigue, and an increase in the subsequent cheerful state.

Table 3. Dynamics of changes in blood pressure and pulse before the start of the experiment of block 1, immediately after and after 15 minutes (average).

Experiment conditions	Systolic pressure	Diastolic pressure	Pulse
Before the beginning	120,08	78,92	70,24
Immediately after the beginning	128,19	82,17	82,16
After 15 minutes	120,96	80,04	76,04

The research revealed the relationship between deep immersion in virtual reality and the psychophysical state of a person and its therapeutic effect.

Repetition of the experiment in 2021, on the same base in the virtual reality laboratory of our partner ARVI VR Inc. (USA), gave the same results within a margin of error of 2%.

3.1. Plans for the implementation and practical application of VR technologies in psychotherapy

Implementation methods and practical application of virtual reality technologies in psychotherapy must meet certain criteria and requirements. These are the requirements for the technical part and the software.

The technical part includes:

- a computer with a connected VR helmet.
- equipped platform for VR-therapy.
- equipment for monitoring well-being (heart rate monitors, blood pressure monitors, etc.).
- camcorder.

The software should contain a few specialized computer programs written specifically for the respective therapy. It is possible to complicate and modernize the therapy program, both programmatically and technically, depending on the tasks set. For a psychotherapy session, the patient is located on a specially-equipped platform. He is wearing a virtual reality helmet.

The psychotherapist is located as close as possible to the computer to implement and control the therapy program, as well as to monitor the patient's condition. During the session and upon its completion, video recording of the session and monitoring of the physiological state of the patient is carried out.

3.2. The prospect of using VR technologies in psychology and psychotherapy

The conducted experiments confirmed the possibility of effective application of VR technologies in clinical psychology (Becker & North, 1998; Wallach et. al., 2006) and psychotherapy in the context of behavioral therapy to remove the fears of people suffering from certain phobias. The main and most common fears are the fear of darkness, heights, closed and open spaces, spiders and snakes, and the fear of flying in an airplane. These phobias are usually accompanied by characteristic obsessive fears, increased sweating, and often provoke panic attacks.

Based on the understanding of Positive Psychotherapy (Peseschkian, 1987), the processing of fears in the space of virtual reality occurs, first, through the body and activity. In the process of being in VR, a person faces his feelings and emotions consciously and all four spheres of conflict processing are activated in one form or another. Separate characteristics of sensations can be conflicting in connection with such experiences. With the help of his/her sensations, a person establishes a connection with virtual reality, which activates his/her previous experience and experiences associated with it. The four areas of conflict processing correspond to cognition, that is, to those areas through which we enter a relationship with reality. In virtual reality, psychological processes are more controlled and directed.

In addition, the behavior, and reactions of a person in VR provide information for the psychotherapist in his work with the patient.

The approach described in this article was based on the safe and controlled ability of a

person to face his/her fears and be able to interrupt this meeting at any time. The method presented includes cognitive-behavioral psychotherapy techniques in the space of deep immersion in virtual reality. If necessary, medical support is possible, in case of risks of panic attacks, at the discretion of the psychotherapist.

Neurosis is generated not only by primary conditions (external and internal situations leading to the first appearance of the symptom), but also by secondary conditions (fixation of fear of expectation). Because phobias are caused by the desire to avoid situations that cause anxiety, it is necessary to break these circular mechanisms of neurosis. It is possible to do this without reinforcing the patient's fears. At the same time, it should be considered that a patient with a phobia is afraid of something that might have happen to him.

The cognitive-behavioral technique is carried out in two stages. The first is the need to bring the patient to the ability to relax. Fear provokes strong physical tension, up to the inability to move, which makes it impossible to work with it. Through relaxation programs, the patient learns to relax and induce this state if necessary and acquires the skills to properly respond to his fear and reduce its intensity. Methods of meditation and auto-training can be applied here. This stage will take about 30-40 days.

When the patient is prepared, the second stage of VR therapy is implemented - work with the phobia itself. Using an appropriate program of a set of exposure procedures, the psychotherapist guides the patient through the virtual spaces of his fears. This creates in a person the ability to reduce anxiety and emotional-reflex reactions to fear-inducing stimuli by consciously immersing him/herself in stressful situations and repeating them to get used to fear-inducing stimuli.

Using special VR programs, the therapist enables the patient to face his/her fears "face to face" in a safe virtual space, which the human psyche also perceives as real. The patient is confronted with stimuli that cause anxiety and fear in real life. During VR therapy, he/she gradually changes his/her reaction to the source of fears, gradually getting used to it, as a result of which anxiety gradually fades away. VR technologies allow the patient to feel that he/she is at a real height, in an airplane or in an elevator, to see creatures in open space or in the immediate vicinity that cause him/her panic

fear. So, step by step, a person burdened with phobias can be brought out of a state of anxiety and, ultimately, relieved of them.

No less serious prospects for the use of VR technologies are in the treatment of depression, stress, and various anxiety disorders. Also, the use of VR opens wide opportunities for diagnosing personal qualities and human pathologies, and in various training aspects, such as straining memory and attention (Becker & North, 1998; Wallach et. al., 2006). Here, VR programs such as quest rooms and labyrinths are more relevant.

VR can help to create an atmosphere of calm and relaxation, especially in meditation, enhancing its action and effect. It is also important to note the potential of virtual reality in training self-regulation skills and increasing the level of emotional stability.

3.3. The main problems associated with the use of VR in psychology

Virtual reality has become extremely popular in recent years as a tool for conducting various researches in the field of psychology and searching for new solutions in psychotherapy. Creating various scenarios and situations allows researchers to study the behavior and reactions of people to various stimuli.

However, the use of VR in psychology may face several serious problems: psychophysiological, confidentiality of patient data, the safety of using the technology, and the risks associated with emotional stress, which must be considered.

It must be understood that the virtual space can be very realistic and detailed, which can lead to a glut of information and emotions. This may affect the perception of reality and the psychophysiological state of participants outside of VR. In addition, it can lead to distortion and complicating the interpretation of research data and the treatment process.

In addition, intense experiences can exacerbate already existing emotional states and have a negative and even traumatic effect, which can lead to negative consequences for the participants.

Also important is the issue of ensuring the rights and interests of participants, primarily of the confidentiality of personal data and the personal life of participants.

It is also worth noting that, to date, not enough research has been conducted in the field

of virtual reality to unequivocally confirm the effectiveness of using VR to treat psychological disorders and dramatically reduce stress levels. There is a need for larger and longer studies to establish the effectiveness and safety of using VR in psychology.

Conclusions

Modern science considers the psyche as a subjective reflection of the objective world. Virtual reality is a pseudo-reality created by means of computer technology that can influence the human mind to perceive VR as something real.

The model of positive psychotherapy does not primarily try to explain the occurrence of certain conflicts but tries to understand the person in his life situation in which he becomes ill. The methods of positive psychotherapy are based on the principles of hope, balance, and counseling, which makes it possible to determine the forms and localization of conflict processing. In the process of therapy, energy is harmonized in 4 main spheres of life activity - bodily, mental, social-communicative, and spiritual. This, in turn, allows effective work with psychosomatics and phobias. This is because positive psychotherapy offers such a concept in its content process, within the framework of which various methods and special directions (metatheoretical and meta-practical aspects) can be rationally applied and complement each other (Peseschkian, 1987).

From the above data, it follows that VR technologies can effectively influence the functional state of a person, and virtual reality can affect his mental states, emotional and psychophysiological spheres of life.

Of special relevance are the development of VR technologies to help psychotherapists work with autistic people and people with post-traumatic psychological problems, as well as with people of advanced age. Although autism is a genetically determined disease that manifests itself in certain disorders in the development of the brain, VR technologies can help in this case too. As a rule, an autistic person is excessively immersed in himself and tends to completely shut himself off from the outside world, seeks to limit his contacts with the outside world as much as possible, and he/she does not perceive generally accepted norms and concepts. With a deep immersion of an autistic person in virtual reality, it

Seems possible to artificially develop insufficiently developed brain functions, stimulating it with special medical and educational computer programs. With the help of games and special exercises in the virtual space, it is possible to develop the large and fine motor skills of an autistic person, attention, memory, and also lead to the ability to communicate with other people (Mi Jin Park, 2019). At the first stage of work, the symptoms that interfere with normal life and the treatment process are eliminated.

Special VR programs can also be very effective in treating people who have experienced severe traumatic events, such as war, terrorist attack, violence, death of a loved one, or other extreme stress. The therapeutic effect of such programs is to introduce the patient into a relaxing state with the gradual acceptance of reality and a change in attitude towards the traumatic event that has occurred. For the elderly, VR programs can be used as supportive therapy for cognitive disorders.

And although the use of VR in psychological practice has great potential, however, it is necessary to solve many problems related to ethical issues for its successful implementation, the sufficiency of research and the complexity of using this technology in psychology and psychotherapy. The use of VR in this area requires special equipment and specialists trained to work with the technology and additional resources. And if these methods are positioned as tools of psychotherapy, of course, one should consider the characteristics of each patient and allow the aforementioned therapy only under the guidance of a qualified psychotherapist.

References

- [1]. **BECKER D. & NORTH M.M.** (1998) The virtual reality therapy system: VRT-2002. *CyberPsychology & Behavior*, pp. 401-403. <http://doi.org/10.1089/cpb.1998.1.401>
- [2]. **FOA E.B., GILLIHAN S.J., BRYANT R.A.** (2013) Challenges and successes in dissemination of evidence-based treatments for posttraumatic stress: Lessons learned from prolonged exposure therapy for PTSD. *Psychological Science in the Public Interest, Supplement*. No. 14, pp. 65-111.
- [3]. **FREEMAN, D., REEVE, S., ROBINSON, A., EHLERS, A., CLARK, D., SPANLANG, B., & SLATER, M.** (2017). Virtual reality in the assessment, understanding, and treatment of mental health disorders. *Psychological medicine*, 47(14), pp. 2393-2400. <https://doi.org/10.1017/s003329171700040x>
- [4]. **KOLENDA-SUJECKA, K.** (2023). The Neuroscience of Story: The Role Of Storytelling In Psychotherapy. *The Global Psychotherapist*, Vol. 3, No. 1, pp. 133-135. <http://www.doi.org/10.52982/lkj192>
- [5]. **PARK, M., KIM, D., LEE, U., NA, E. J., & JEON, H. J.** (2019). A Literature Overview of Virtual Reality (VR) in Treatment of Psychiatric Disorders: Recent Advances and Limitations. *Frontiers in Psychiatry*, 10. <https://doi.org/10.3389/fpsy.2019.00505>
- [6]. **OPRIȘ D.** (2012) Multilevel analyses of the mechanism of virtual reality intervention in emotional disorders, Ph.D. THESIS SUMMARY. URL: https://doctorat.ubbcluj.ro/sustinerea_publica/rezumate/2012/psihologie/Opris_David_EN.pdf [Accessed: 05.05.2023]
- [7]. **PESECHKIAN, N.** (2016). *Positive Psychosomatics: Clinical Manual of Positive Psychotherapy*. Bloomington, USA: AuthorHouse. 601 p.
- [8]. **PESECHKIAN, N.** (2016). *Positive Psychotherapy: Theory and Practice of a New Method*. Springer; 1st edition. 462 p.
- [9]. **WALLACH H.S., BAR-ZVI M., SAFIR M.** (2006) Virtual Reality-Assisted Treatment of Public Speaking Anxiety. *CyberPsychology & Behavior*, V. 9 (6), pp. 725—726. <https://doi.org/10.1037/e695432011-143>
- [10]. **WALLACH, H. S., BAR-ZVI, M., COMBESURE, M., & VAN DER LINDEN, M.** (2017). Virtual reality as a tool for reducing stress and anxiety in the workplace. *Cyberpsychology, Behavior, and Social Networking*, 20(4), pp. 229-233.
- [11]. **БРЫЛЕВСКАЯ, А. А. [BRYLEVSKAYA, A. A.]** (2009). Философские аспекты проблемы восприятия образов компьютерной виртуальной реальности [Philosophical aspects of the problem of perception of images of computer virtual reality. *Вестник Ленинградского государственного университета им. А.С.Пушкина*. Т. 1. № 3. С. 147-156. [in Russian]
- [12]. **КОТЕНЁВА, А. В. [KOTENEVA, A. V.]** (2016). Личностные уровни и система жизнеобеспечения личности в стрессовых ситуациях [Personality levels and life support system in stressful situations]. *Вестник Костромского государственного университета*. [Personal levels and system. Life support personality in stressful situations. Серия: Педагогика. Психология. Социокинетика. Т. 22. № 1. С.111-116. [in Russian]

- [13]. **МАЛКИНА-ПЫХ, И. Г. [MALKINA-PYKH, I. G.]** (2008). *Психосоматика. Справочник практического психолога «Психосоматика»*. [Psychosomatics. Handbook of practical psychologist "Psychosomatics"]. М.: Эксмо, 563 с. [in Russian].
- [14]. **СЕЛИВАНОВ, В.В. (ред.) [SELIVANOV, V.V. (Ed.)]** (2015). *Психология виртуальной реальности: Учебное пособие [Virtual Reality Psychology: Tutorial]*. Смоленск: Издательство СмолГУ. 152 с. [in Russian]
- [15]. **СЕЛИВАНОВ В.В., СЕЛИВАНОВА Л.Н. [SELIVANOV, V.V., SELIVANOVA, L.N.]** (2015a). Эффективность использования виртуальной реальности при обучении в юношеском и взрослом возрасте [Efficiency of using virtual reality in teaching in youthful and adulthood. *Непрерывное образование: XXI век*. №1 (9). С. 133-152. [in Russian]
- [16]. **СЕЛИВАНОВ В.В., СЕЛИВАНОВА Л.Н. [SELIVANOV V.V., SELIVANOVA L.N.]** (2015b). Познание и личность в виртуальной реальности [Knowledge and Personality in Virtual Reality]. In: *Селиванов, В. В. Психология когнитивных процессов*, (С. 107-120). Смоленск: СмолГУ. [in Russian]
- [17]. **ТАШЛИЕВА, Б. К. [TASHLIEVA, B. K.]** (2017). Виртуальная реальность как фактор образовательной среды [Virtual reality as a factor in the educational environment]. *Развитие современной науки: теоретические и прикладные аспекты*. № 11. С. 58-60. [in Russian]
- [18]. **ЩЕРБАТЫХ, Ю. В. [SCHERBATYKH, J. V.]** (2002), Психология страха [Psychology of fear]. М.: Эксмо. [in Russian]