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ANATOMICAL THEATER IN THE CONTEXT OF DIGITAL TECHNOLOGIES

Abstract. Against the background of the development and widespread use of digital technologies, such research and educational practices as anatomical theater have undergone significant changes. These changes, as an urgent scientific problem, need to be understood in the interdisciplinary discourse, which is formed at the intersection of culturology, medical engineering and philosophy of technology. The purpose of this study is to analyze the transformations of anatomical theater under the influence of new technologies, in particular, digital. Analysis of the history of the origin and functioning of anatomical theater as a phenomenon of European culture shows that for a long time it met the demands of society to study the human body as a biological object – its composition, structure. This demand was formed under the influence of the cultural paradigm of the Enlightenment with the growing authority of science, including scientific science. The theatrical nature of public autopsies allowed to popularize the scientific achievements of anatomy and medicine in the most accessible and mass (at that time) form. At the same time, the audience received not only knowledge, but also the spectacle and reputation of a modern, educated man. When the mysteries of the anatomy of the human body were almost gone, interest in anatomical theater as a public research event disappeared. New ways to satisfy this curiosity have emerged, from printed illustrated medical atlases to virtual computer dissections that are available to any user of digital gadgets. Anatomical theater as a scientific, cultural and social phenomenon has not disappeared. It still remains a part of mass culture, but acquires new forms of actualization – with changing goals and meanings – in a new technological context, within the new paradigms of the digital age.

Key words: anatomy, public autopsies, digital medicine, biomedical engineering, medical education, philosophy of technology, popularization of scientific knowledge.

1. Introduction

Digital technology is becoming an integral part of modern medicine and medical education. These technologies contribute to the development of medical theories, practices, equipment, teaching methods, as well as the emergence of new branches of medicine, such as computer diagnostics, telemedicine, etc.

Against the background of the development and widespread use of new technologies, such research and educational practices as anatomical theater have undergone significant changes. These changes, as an urgent scientific problem, need to be understood in the interdisciplinary discourse, which is formed at the intersection of culturology, medical engineering and philosophy of technology.

A review of previous publications shows that the philosophy of technology [1] is currently based on various concepts and hypotheses, including technological pessimism (or alarmism) [2], technological optimism [3], techno-humanitarian balance [4], transhumanism [5], etc. Their appearance is due to the need to understand the current situation and predict future scenarios of civilization. A special place in this discursive field is occupied by issues related to the introduction of new technologies in medicine (for example, with the formation of digital medicine based on artificial intelligence [6]), medical engineering [7], biomechanics [8], as well as the training of specialists who must work in the new technical and bioethical reality [9].

In this discourse, the phenomenon of anatomical theater is almost not discussed, because it is believed that anatomical theaters are a thing of the past, and interesting only in the context of the history of medicine and culture. However, there is reason to speak not about the disappearance of this phenomenon, but about its acquisition of new forms and meanings [10]. So we need to find out what these transformations are and why they are happening.

Purpose and methods of research

The *purpose* of this study is to analyze the transformations of anatomical theater under the influence of new technologies, in particular, digital.

The main research methods: analysis and synthesis (to summarize the identified factual material); historical-chronological and comparative (to trace the changes that took place in the forms of anatomical theater over time); semiotic (to identify meanings in various forms of anatomical theater).

The theoretical basis of the study is the concept of theatrical socio-communicative manifestations of culture [11], which allows analyzing various cultural and scientific-technical phenomena, characterized by publicity, in the dynamics of their changes with changing cultural context.

Results

Today, in the phrase “anatomical theater”, the word “theater” is perceived as a metaphor, because the dissection of corpses is carried out exclusively for research and educational purposes in medical institutions. However, historically, as a specific phenomenon of the Enlightenment, it was the theater – with a stage and auditorium, a certain drama, the division into acts with intermissions, roles and appropriate scenography.

The anatomical theaters often resembled the amphitheaters of ancient Greece. For example, the anatomical theater, which opened in 1490 in Padua, was designed for 200 spectators. The rector, professors, and members of the medical institution were to stand in the front row. The second and third rows were reserved for students, the rest were open to the public.

On the “stage” the action took place according to the established “scenario” according to the “roles”: the professor, sitting in a high chair, gave instructions to the surgeon (*demonstrator*), who actually performed the autopsy, and the assistant (*ostensor*) pointed (for the audience) to parts and organs named by the professor.

Sometimes there were innovators who broke the rules, broke the “laws of the theater genre.” For example, in January 1315, the Italian anatomist Mondino de Luzzi began to conduct operations in person, performing all the roles on his own – surgeon, assistant, commentator – and even having time to record observations and remarks in his workbooks. It was like a one-actor theater with its own drama.

The division into “acts” in the anatomical theater was that usually each public autopsy was performed for several days: on the first day the abdominal cavity was opened, on the second day the audience was shown the chest, on the third – opened the skull.

These acts of the play were considered the most interesting. In the following days, when it came to bones, joints, tendons, etc., the number of spectators decreased significantly [12]. In some theaters, the autopsy was accompanied by music, and during the “intermissions” the audience was offered a variety of drinks and snacks [13].

Performances in anatomical theaters were in high demand. They were visited by residents of other cities, sometimes whole families, with children [13]. The popularity of these performances (or reality shows) was due to two main reasons.

First, they were entertaining events. In Amsterdam, for example, in 1606 a law was passed regulating public autopsies. According to this document, the anatomical theater was to become a space of public leisure. At that time, anatomical theater was not only documentary, but also practically equal to dramatic theater. Both theaters gave spectacles that were hotly debated by the community and in the secular chronicle [14].

Secondly, visiting the anatomical theater allowed not only to get unforgettable impressions, thrills, but also to show yourself as a modern person who seeks knowledge, keeps pace with progress. After all, it was the era of the Enlightenment, when the foundations of the natural sciences were laid, and the authority of science, interest in nature and the biological essence of man grew among the general public.

Demand began not only for public autopsies, but also for group portraits with dissected corpses. A striking example here is Rembrandt’s “The Anatomy Lesson of Dr. Nicolaes Tulp” (1632) and “The Anatomy Lesson of Dr. Deijman” (1656). These paintings are another form of ana-

tomical theater. Here the emphasis is shifted from the actual anatomy to people interested in this science.

In the 20th century, interest in the anatomy of the human body disappears from public life. As noted by A. Kravetsky, “people are willing to talk about medicine and treatments, but no one thinks out of curiosity or for the sake of general development to visit the anatomical theater” [14].

Anatomical theaters have begun to close, and those that have survived (for example, in London, Amsterdam) now operate as museums.

However, the fact that interest in the anatomy of the human body is no longer publicly manifested does not mean that it does not exist. Just now this curiosity can be satisfied in other ways.

According to K. Shcherbakova, A. Vodolazov and V. Boldov, “in the XXI century, any citizen who is interested in human anatomy can download a virtual human atlas to his gadget, where in 3D format each organ is shown and described separately, and in the system. In one click, you can remove the skin from the virtual body, then remove the muscles, internal organs in layers, look at the body in detail from all sides. And you do not need to buy a ticket to such a virtual anatomical theater” [12].

However, it is not just about the availability of new technologies. It’s not about technology at all. After all, even without these technologies, nothing prevented people from looking at anatomy textbooks, illustrated medical encyclopedias and reference books, printed anatomical atlases, and so on. The fact is that the change in the format of anatomical theater – from real to virtual – is associated with a change in its purpose. If in the past autopsies were performed to find out what is inside a person, how it is interconnected and how it works; now there is no such goal. After all, everything is already known. Everything down to the smallest detail has been studied and recorded: in drawings, photographs, X-rays, etc. Therefore, modern anatomical theater is not aimed at studying the unknown, but at reproducing what is already known [10].

And here, indeed, new technologies come in handy, and not just digital. After all, modern medicine has many models, three-dimensional models, simulators, phantoms, mannequins, robot simulators, computer simulations, etc., which most accurately reproduce the appearance and functions of various parts of the body, organs and systems of the human body. Augmented reality (AR) technologies are also being introduced, which are used, for example, in laparoscopic (without incisions, through small holes) operations, when the image on the endoscope is supplemented by the image obtained during intraoperative angiography. This allows the surgeon to know exactly where the tumor is in the body to minimize the loss of healthy tissue during surgery to remove the tumor.

This entire “arsenal” is used not only for the training of medical professionals in various specialties and in their professional activities, but also in cinema – the most popular art form. Make-up artists, props, and computer graphics specialists are also involved here, creating very believable “pictures” of human bodies on the screen, which appear on the tables of pathologists and forensic experts.

Today, it is difficult to even list all the films and TV series in which dissected “corpses” appear with all the anatomical details: CSI: Crime Scene Investigation, USA, 2000; Bones, USA, 2005 – 2017; Murdoch Mysteries, Canada, 2008; House, M.D., USA, 2011; The Doctor Blake Mysteries, Australia, 2013; Forever, USA, 2014–2015; Harrow, Australia, 2018; “Autopsy will show”, Ukraine, 2019 – 2020 and many others.

However, it would be wrong to say that all this on-screen anatomical theater is aimed only at demonstrating human anatomy and the capabilities of modern visual technology. After all, screen “autopsies” and pathological “research” are often accompanied by reflections on humanity, the consequences of actions and lifestyles, moral values and all that worries people about life and death.

In this sense, the dialogue of the characters of the series “CSI: Miami” is quite revealing, when the pathologist, looking at another corpse, asks: “Who could do that?” Lieutenant Kane answers: “He who does not value life.”

That is, the anatomical “picture” is not an end in itself, it becomes an occasion for the development of the plot and part of the scenography, in which the characters act and reflect. This not on-

ly allows authors to make their messages more visible and understandable, but also helps to popularize science (although sometimes with errors), to strengthen the authority of the professions of scientist, doctor, criminologist and more.

Conclusions

Analysis of the history of the origin and functioning of anatomical theater as a phenomenon of European culture shows that for a long time it met the demands of society to study the human body as a biological object – its composition, structure. This demand was formed under the influence of the cultural paradigm of the Enlightenment with the growing authority of science, including scientific science. The theatrical nature of public autopsies allowed to popularize the scientific achievements of anatomy and medicine in the most accessible and mass (at that time) form. At the same time, the audience received not only knowledge, but also the spectacle and reputation of a modern, educated man.

When the mysteries of the anatomy of the human body were almost gone, interest in anatomical theater as a public research event disappeared.

However, this does not mean a loss of interest in the anatomy of the human body in the general public. New ways to satisfy this curiosity have emerged, from printed illustrated medical atlases to virtual computer dissections that are available to any user of digital gadgets.

This leads to the conclusion that the change in the format of anatomical theater – from real to virtual – is associated with a change in its purpose: modern anatomical theater is not aimed at studying the unknown, but to reproduce what is already known.

Today, the film and television industries help such a theater to remain a phenomenon of mass culture. “On-screen” anatomical theater aims not only to demonstrate human anatomy and achievements of visual and digital technologies, but also to create a certain scenography, in the context of which the characters sometimes reflect on life and death, philosophize about the meaning of life.

This helps to solve problems such as:

- formation of a certain visually of the main messages of films in order to increase their effectiveness, drama, understanding;
- popularization of science and technological innovations;
- consolidating or increasing the authority of the professions of scientist, doctor, criminologist, etc.

Thus, we see that anatomical theater as a scientific, cultural and social phenomenon has not disappeared. It still remains a part of mass culture, but acquires new forms of actualization – with changing goals and meanings – in a new techno-cultural context, within the new paradigms of the digital age.

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