The Problem of Subjectivity in Algorithmic Creativity Organisation

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Abstract. *The aim of the article* is to study the issue of determining subjectivity, authorship and uniqueness of the results of producing the creative process, organised by the use of algorithmic calculations. *Results.* The article clarifies the possibility of organising the artistic and creative process using mathematical calculations, and automating the reproduction of certain manipulations, additionally, it reveals signs of the uniqueness of the corresponding generation results, and grounds the degree of automating the cultural process. *The scientific novelty* of the article is revealed in the process of highlighting technical assets of modern art, which, although slowly, nevertheless quite demonstratively show the potential of algorithmic computing as a stimulator of creative innovations. Among the methods used in the process of analysing the issues which are raised in the article, first of all, the analytical method has to be singled out, that is based on both historical and philosophical processes, as well as modern cultural activity. *Conclusions.* It is revealed that algorithmic creativity is actually a kind of mechanised production process, organised in accordance with the features of machine training, and the identified signs of stylistic imitation of traditional practices. Two types of practices for organising the corresponding creative process are established according to the degree of interaction of artists with robotic systems: practices where robotic mechanisms become "subjects of creativity", that is they are able to produce content for organizing artistic processes; practices involving the equal interaction of robotic mechanisms and artists (for instance, in theatrical performances). The cultural process automation leads to the decrease in the artist's participation, and weakening of his authorship, but he still has an absolute advantage in the thinking orientation. Interpretation of meaningful content is a critical problem in relevant practices. The usage of algorithms in creating art products challenges traditional methods of artistic cultural creation, as the artist's meaning and intentions are not always clear. Evaluating further prospects for the artistic culture development requires taking into account these aspects, and recognising potential consequences of forming algorithmic creativity for the further cultural development of humanity.

Keywords: algorithmic creativity; digital technology; cultural practice; subjectivity

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Introduction

The problem of artistic culture rethinking is actualised in the context of modern cultural and anthropological studies, the function of which is the search and study in social changes space. In recent decades, the research space of modern cultural studies actualises appealing to the phenomenon of algorithmic creativity (Edmonds, 2018; Verostko, 1998), which, taking into account the theoretical interest of specialists in scientific and technological orientations of the humanities, actualises the problem of the culture-creating process automation, which requires a clear delineation of its own production specifics.

The problem of artistic culture rethinking is actualised in the context of modern cultural and anthropological studies, the function of which is the search and study in social changes space. In recent decades, the research space of modern cultural studies actualises appealing to the phenomenon of algorithmic creativity (Edmonds, 2018; Verostko, 1998), which, taking into account the theoretical interest of specialists in scientific and technological orientations of the humanities, actualises the problem of the culture-creating process automation, which requires a clear delineation of its own production specifics.

Rapid developing of natural sciences and technical progress led to significant changes in social production in social production in general, and in artistic one in particular. The fourth scientific and technical revolution, marked by significant development of algorithmic computing methods, swept the world, and had a notable impact on artistic culture and the definition of its subjectivity. In the process of mechanisation and automation of cultural practices, the generally accepted (mentioned above) creative mechanism, which was characterised by the fact that the artist was the only one creator, turned out to be unable to satisfy current aesthetic needs. It is not about talking about the disappearance of the noumenon of the creator of artistic work, but about the participation of the viewer in the direct automated process of production activity. These transformations actualise ethical and social issues regarding the role of technologies in artistic culture, the artist's freedom, and the interpretation of obtained results for the aesthetic aim of some definite creative activity organisation. The issues that are the subject of theoretical analysis in this article belong to different fields of humanitarian knowledge, such as philosophy of technique, cultural studies, art history, psychology, that prompts using interdisciplinary approach, which is a powerful factor in cultural analysis.

Recent Research and Publication Analysis. The most important contributions to studying the creative process automation in recent years were made in the aspect of the "constructivist" theory. A particular advantage of such contributions lies in the detailed description of how technological elaborations actually occur, emphasising the role of a person in specific contexts interacting with social forces, group interests, balance of power, etc. These issues are especially relevant in publications devoted to the analysis of implementing "artificial intelligence" technology in cultural and artistic practices. Recently, the active implementation of computational methods has led to the rapid growth of review publications of technological developments in the generative process organisation through the mathematical calculations usage, the introduction of "artificial intelligence" technology, scanning and stereolithography. Computational

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creativity becomes a subject of research in the works of K. Ames and M. Domino (1992, p. 186), M. Pearce, D. Meredith and J. Wiggins (2002). On the basis of their own technological elaborations, the authors offer to investigate the possibility of autonomous generation of a musical series through the computational models operation. M. Andujar, K. Crawford, A. Nijholt, F. Jackson and J. Gilbert (2015), offer the definition of artistic interfaces "brain – computer" according to four criteria: human-computer interaction, neurophysiology, art and computer technology.

One of the main debates causing the artistic culture created by applying algorithmic calculations is the issue of authorship and creative uniqueness. K. Luchiari, R. Folgieri, L. Dei Cas and F. Soave (2016) investigate the interaction of mechanised and human activity during the creative process organisation. A major limitation of these approaches is the usage of invasive brain computer interface in order to achieve device control. A research work by A. Wadeson, A. Nijholt and C. Nam (2015) reviews creative practices with introducing digital innovations, classifying four types of the user control: selective control, passive control, direct control and joint control. This principle of interaction between mechanised and human activity is partially followed in the further study. However, these works represent technological studies, instead, conceptualisation of the algorithmic creativity phenomenon and the problems that arise during organising the corresponding production process remain outside their attention. The identified problem of some insufficient level of analytics indicates the necessity to conduct this research.

Aim of the article

The aim of the article is to study the issue of possibility to organise the cultural process using mathematical calculations, and automating the reproduction of certain manipulations, determining subjectivity, authorship and uniqueness of the results of the creative process production, organised by the algorithmic calculations use, outlining the "problem field" of algorithmic creativity, and systematising directions of scientific process, which seem theoretically promising.

Main research material

The problem of this research is actualised by implementing innovative (mechanised and digital) technologies in the cultural process organisation, which causes forming a new artistic creativity aesthetic, and is expressed not only in the renewal of the technical and technological component of the production process, but also in the new forms emergence. Regarding the latter: it is worth noting the "drawing machine" (1962), offered by D. Henry for mechanised drawing of abstract but repetitive drawings (O'Hanrahan, 2001). Later, this mechanised device prototype was transformed into a device for creating awe-inspiring images (aesthetic purpose), because each created image was unique and unrepeatable. The marked variability of the image and the unpredictability of the drawing process were explained by the elaborator that the "mechanised hands" of the device worked on the principle of random interconnections in the

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location of mechanical components of each machine, and the slightest change of which could sharply affect the final result (Thompson, 1992, p. 49). This peculiarity formed favourable conditions for the creation of production results, unique in their specificity and unexpected for observers.

Similar attempts to mechanise creative activity took place in the music-making practice, which resulted in the appearance of a pianola (invented by E. S. Voti in 1896), which "plays" without the performer's participation (by means of a pneumatic or elec-tromechanical mechanism) (Reblitz, 2001, p. 45). The latter controls the instrument using a programmed musical sequence, recorded on perforated paper or metal rolls. Thus, the mechanism does not require manual control (Roehl, 1973, p. 316).

Taking into account successful attempts to mechanise the process of cultural cre-ation, the issue of the uniqueness of works in "factory" production became relevant (Penny, 2013). The fact that the performance process (making music or painting) is carried out by imitating a living traditional technique (as in the case of the musical pianola and the "painting machine") conclusively proves that a mechanically repro-duced artistic work cannot be re-evaluated as an original creation from the original source (Ferrari et al., 2016). For example, in the building of "Ocean Plaza" (2023) a mechanised piano presents music by Ukrainian composers. Despite the originality of this mechanisation process, the material for audience consumption remains the music of outstanding Ukrainian composers. At the same time, the instrument, like a record player, only performs the function of the written score reproducing. So, by imitating human traditional technique, such an illusion is created that a musical sequence is performed by this instrument functioning. And on the contrary, as a result of tradition-al music-making techniques, well-known compositions dictate the algorithm of their reproduction to mechanised equipment.

A similar illusion of "live performance" is observed in events organised with the participation of mechanised devices, mechanical-musical rock group "Compressor-head" (*V Ukraini vystupyv rok-hurt*, 2019). In the mentioned "robot ensemble" there are only three "performers": a robot "drummer", who has four mechanised "arms", two mechanised "legs", and works on fourteen drum machines; a robot "guitarist" with two hands, seventy-eight fingers on each, and a robot "vocalist" who "can" change the tones and registers of his voice in a very wide range (Sovhyra, 2021, p. 299). Despite the fact that the presented works are able not only to imitate human activity, but also tech-nically surpass human capabilities to a large extent. Still, they are not able to create musical parts and improvise like real musicians independently.

In cultural practices, implementing robotic mechanisms is carried out by conduct-ing algorithmic data analysis. As a result, the devices can perform certain manipula-tions for the audience at some unexpected moment (complicit in the action). For ex-ample, the inclusion of the non-anthropomorphic robot "YOLO" in a children's perfor-mance allows the event to be interactive (Lubart et al., 2021). The robotic device can ask a child a series of questions; as a result of processing the received answers, feedback is formed regarding the creativity of the participants of the "mechanised game", and the likely success of further execution of certain programmed tasks. Afterwards, this robot can reproduce the heard sounds with some additional variations. As a result, it has an original sound of the reproduced composition. From this point of view, the robotic mechanism becomes an assistant for organising interactive artistic creativity.

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A similar interaction is observed at the presentation of the robotic mechanism A3-K3 functioning (robotic mechanism "Cook", festival "Ars Electronica", Linz, Austria, September 7–11, 2017), with the help of which it became possible to "write" a picture mechanically. It is about the robot creating an image that the user imagines and plans to draw, while he does not make any movements by himself (A3 K3 by Dragan Ilic at Ars Electronica Festival, 2017). This is done by monitoring the user's mental state (a 10-year-old boy in the video), in order to modify the robotic device functioning. Signals are received by electroencephalography (EEG) amplifier, and sent to a brain controller interface (BCI) (gtec medical engineering, 2018).

The brain controller module classifies the signals, and sends tasks through the network system to the "robotic arm", which transfers each task into commands for the robot. In such a way, the mechanism serves as a "neuroprosthesis" for the user with the help of non-invasive brain computer interface. On the example of the studied video material, it can be noted that the boy imagines the shape of a circle of certain considerable size. Accordingly, the machine performs the necessary movements to draw the desired image mechanically. So, the child does not perform any physical action. The creative process is carried out only at the expense of the mechanised hand (Tramonte et al., 2019). In this way, "human-robot" interaction is aimed at finding new mechanised ways of realising the author's vision. The offered robotic architecture is able to recognise the users' mental state according to the biological feedback factor, grounded on its focus of attention.

If in the first case (automated programming) the robot performs actions that are programmed exclusively by a human, and it serves only as a technical toolkit, then in the second case, the mechanism functions independently (although with the appropriate programming of actions), and without any human intervention. Accordingly, brain-computer creative activity is carried out due to a hybrid approach to implementing the production process (a combination of human activity, and the functioning of robotic equipment).

These significant changes in transforming the artistic creativity process lead to the reduction of invariance, improvisation, and the author's approach to the choice of techniques and technology for the artistic creativity organisation. Inherent in the individual artistic process, the author's style is transformed into a clearly planned method of calculating mechanised manipulations. At the same time, this fact proves an important peculiarity of mechanised mechanisms, in order to imitate the functions of a performer, actor, "participant of the team" by means of "machine training". Due to the functioning of robotic mechanisms, it becomes possible to scan the actions of the performers and the audience (Bostrom, 2014). This testifies to the uniqueness of the robotic mechanism functioning on the stage, which makes it possible to create the illusion of interaction between real and mechanical actors.

As a result, robotic machinery became capable not only to perform programmed movements, but creative manipulations as well. If the concept of "creativity" is studied as an ability to generate a new, original result (work, ideas, etc.), which has meaning and value in a certain context, then in the functioning of robots on stage platforms, a creative (creative) process is formed.

Nowadays, there are already several projects in which the illusion of direct communication between the actor and the robot is created. A Japanese director H. Ishiguro,

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in the experimental theatre project "Actors-robots" (2015), tried to show how people and mechanisms can think about social and cultural problems and easily communicate (Paré, 2015). The idea of H. Ishiguro was to show certain social and cultural problems that may arise in future in case of active improvement of robotic technologies. It is interesting that in this performance the robots had to "play" different roles (robot-"human", robot-"animal", etc.), and actively interact with partners and the environment in total (shaking hands, playing football, turning to the interlocutor, changing locations). Thus, on stage, the illusion was created that robots could have partial freedom of will and autonomy (improvisation). It is surprising that according to developers K. Ogawa, K. Taura and H. Ishiguro (2012), the audience liked the work of androids more than the performance of real actors.

According to researchers (Bruce et al., 2000), the dramatic plot develops not by certain manipulations reproducing, but by programming to perform long-term tasks. Actor robots are programmed to achieve a final goal, a result that they have to realise by overcoming certain obstacles. However, these obstacles are different every time, and therefore the robot does not repeat the same actions. Still, it works autonomously and unpredictably for the audience. This variability in the actions of the robotic mechanism imitates some improvisational play of real actors and creates the illusion of freedom.

So, digital technologies, including "artificial intelligence" using computer algorithms and sensors, can automatically capture the actions of the audience through the camera, and then send feedback signals through the output device in order to interact with it. This peculiarity of the cultural practice mechanisation provides an opportunity to create conditions for the audience participation in the creative process. As a result, practices of using a neural network and carrying out possible "machine training" provides an opportunity to mechanise the cultural process without the visible performer's participation. Ultimately, digital technologies can free a person from regularly repetitive and simple tasks, leading to a significant increase in work productivity (Chen et al., 2020).

In spite of the revealed possibilities of generating a product similar to the work of a certain artist, ideological, semantic and conceptual content is excluded in the practices of algorithmic creativity. Because of this, some conceptual errors can occur in the culture-creating process. So, in nowaday's algorithm, creativity is only a mechanical act of consolidating certain manipulations, which (as it turns out) mostly imitate human creative activity (Dautenhahn, 2007). Therefore, the result of the corresponding activity can lack the emotional depth inherent in human experience and self-expression; a critical approach to clarifying aesthetic, technical and social dimensions of algorithmic creativity remains important.

Summarizing the results of the review of the practices of the creative process organising with the involvement of mechanised practices, it is possible to distinguish three categories, which are characterised by different functional tasks in the process of the corresponding "interaction" (Burleigh et al., 2013).

Interpretation of the meaningful content is a critical issue in relevant practices as well. The use of algorithms in creating art products challenges traditional methods of artistic cultural formation, as the meaning and intentions of the artist are not always clear. Evaluating further prospects for the development of artistic culture requires tak-

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ing into account all these aspects, and recognising the potential consequences of this new technology for the further cultural development of mankind.

The technological changes consequences become intermediate results in view of the rapid renewal of cultural practices. Some corresponding situation is observed in forming the cultural reflection on the importance of technology in artistic creativity, which is interdependent with changing social circumstances. That is why it appears to be an important issue to outline the prospects for the technological progress of artistic culture.

Further prospects for technological transformations in artistic activity are promising: in future, the development of neural creativity, biological and artificial interaction will provide an opportunity to interactively co-generate what a person sees and uses.

Conclusions

Algorithmic creativity is actually a kind of mechanised production process, organised with taking into account the features of machine training, and the identified signs of stylistic imitation of traditional practices. According to the degree of interaction of artists with robotic systems, it is possible to distinguish two types of practices in organising some certain creative process:

The first type includes practices where robotic mechanisms become "subjects of creativity", i.e. capable of producing the content for the artistic process organisation. The second type involves the equal interaction of robotic mechanisms and artists, for example, in theatrical performances. Due to machine learning, robotic mechanisms can "adapt" to new circumstances, accordingly, in such a form of "complicity" of a human and a robot, the illusion of "improvisation" arises through the variable reproduction of actions in order to perform some programmed task. The usage of mechanised and robotic systems in the artistic and cultural process organisation actualises the question of the artist's role. The quality of the algorithms and the accuracy of the data used in the process of implementing machine training can have a significant impact on the final result. The cultural process automation leads to the decrease in the participation of the artist, as well as to the weakening of his authorship. But still, he has an absolute advantage in the orientation of thinking.

In relevant practices, interpretation of meaningful content is also a critical issue.

The use of algorithms in creating art products challenges traditional methods of artistic cultural creation, as the artist's meaning and intentions are not always clear. Evaluating further prospects for the artistic culture development requires taking into account all these aspects, and recognising the potential consequences of this new technology for the further human cultural development.

The scientific novelty of this research consists in the fact that for the first time the problem of subjectivity in organizing the culture-creating process, formed by the use of algorithmic calculations, is studied. Additionally, the phenomenon of algorithmic creativity is conceptually understood in the context of the review of automated practices of the cultural-creating process.

Prospects for further research. The technological changes consequences become intermediate results in view of the rapid renewal of cultural practices. The corresponding

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situation is observed in the cultural reflection formation on the importance of technology in artistic creativity, which is interdependent with currently changing social circumstances. So, it is an important issue to outline the prospects for the technological progress of artistic culture.

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Conflict of interests

The author declares that there is no conflict of interests.

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Проблема суб'єктності в організації алгоритмічної творчості

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Анотація. *Мета статті* — дослідити питання визначення суб'єктності, авторства та унікальності результатів продукування творчого процесу, організованого через застосування алгоритмічних обчислень. *Результати дослідження*. У статті з'ясовано можливість організації художньо-творчого процесу з використанням математичних обчислень та автоматизації відтворення певних маніпуляцій, виявлено ознаки унікальності результатів відповідної генерації та обґрунтовано ступінь автоматизації культуротворчого процесу. *Наукова новизна* статті виявляється у процесі розкриття технічних надбань сучасного мистецтва, які, хоча і повільно, проте доволі показово розкривають потенціал алгоритмічного обчислення як стимулятора творчих інновацій. Серед методів, що використовувалися у процесі аналізу питань, порушених у статті, передусім виокремимо аналітичний метод, спираючись на який розглядалися як історико-філософські процеси, так і сучасна культуротворча діяльність. *Висновки*. Виявлено, що алгоритмічна творчість є фактично різновидом механізованого виробничого процесу, організованого з урахуванням особливостей машинного навчання та виявлених ознак стилістичного наслідування традиційних практик. За ступенем взаємодії митців із роботизованими системами встановлено два типи практик організації відповідного творчого процесу: практики, де роботизовані механізми стають «суб'єктами творчості», тобто здатні виготовляти контент для організації художнього процесу; практики, що передбачають рівноцінну взаємодію роботизованих механізмів і митців (наприклад, у театральних виставах). Автоматизація культуротворчого процесу призводить до зменшення участі митця та послаблення його авторства, однак він має абсолютну перевагу в орієнтації мислення. Інтерпретація змістового наповнення є критично важливою проблемою у відповідних практиках. Використання алгоритмів для створення продуктів мистецтва кидає виклик традиційним методам художнього культуротворення, оскільки значення та наміри митця не завжди зрозумілі. Оцінювання перспектив розвитку художньої культури потребує врахування зазначених аспектів і визнання потенційних наслідків формування алгоритмічної творчості для культурного розвитку людства.

Ключові слова: алгоритмічна творчість; цифрова технологія; культурна практика; суб'єктність