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Rethinking Art and Aesthetics in Times of the Fourth Industrial Revolution

editor
Joanna Szczepanik

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Joanna Szczepanik

 <https://orcid.org/0000-0002-6371-4161>
West Pomeranian University of Technology, Szczecin
jszczepanik@zut.edu.pl

AESTHETIC EXPERIENCE IN THE TIMES OF THE FOURTH INDUSTRIAL REVOLUTION. INTRODUCTION

The articles presented in this volume are the result of a series of seminar meetings of the Polish Society for Aesthetics under the common title “Aesthetic experience in the times of the Fourth Industrial Revolution”, held in five academic centers: Lublin, Warsaw, Łódź, Szczecin and Gniezno in the academic year 2023/2024. The inspiration for this undertaking is the participation of PSA researchers in the international project “Communities and Artistic Participation in Hybrid Environments” (2022–2026), bringing together both practitioners and theoreticians of art. Its aim is to research, implement and develop an improved model of interaction and somatic participation in hybrid environments.

Aesthetics, as a field exploring the area of the senses, is an appropriate space for undertaking theoretical reflection on the transformation of man and culture in the context of technological development. Thus, the series of seminars became an excellent opportunity to exchange reflections on the subject of aesthetic experience in the perspective of the Fourth Industrial Revolution. The presented



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issue covered such topics as the direction of changes in the experience of art, aesthetic aspects of artificial intelligence, creativity and mimesis, philosophical reflection on street art, and studies on critical infrastructure and various dimensions of technological anxiety. At the same time, the examples of phenomena from the area of visual arts and contemporary culture cited by the authors take into account their unique cultural, social and geographical context.

We open the issue with an analysis of a phenomenon directly observed in urban space, which, however, intertwines with virtual reality. Aleksandra Łukaszewicz focuses on the process of virtualization of public art in its various forms and technological mediations, such as qr graffiti, AR and VR, drawing our attention to the “materiality” of the image that appears for a short moment on the screens of our devices. Contemporary aesthetic experience increasingly goes beyond traditional exhibition spaces, moving to the virtual world. The Fourth Industrial Revolution is redefining the concept of public art, which today exists simultaneously in the physical and digital realms, creating a complex, hybrid environment. Street art, once a form of subversion and independence, has been subjected to medialization and has gained “immortality” on the web. Has it lost its original aura because of this? The researcher also reflects on the social dimension of the hybridization of space and art. She cites both projects from African countries, whose authors use VR to tell their own stories without a colonial filter, as well as global initiatives redefining the concept of the artist’s “visibility”. In this context, technology ceases to be just a means of expression, and becomes a tool of inclusiveness and agency. However, the virtualization of public art is not only about “transferring” it to the web, but also about transforming the entire aesthetic experience. Art becomes more performative, oriented towards presence and relationship – according to Hans Belting, the human body remains its main medium and location.

Next, we focus on theory and practice from a historical perspective, presenting the “genealogy” of technology-based aesthetics and the evolution of aesthetic experience in the context of the development of genetics and bioart. Sylwia Szykowna explores the issue of the collision of machine and human in the era of artificial intelligence. In doing so, she opens up the question of the nature of art and the limits of human creativity. The Author points out that although visions of technological singularity are fueled by large technology corporations, it is humans who program it and give it shape. Although computer art aroused more interest at the beginning as a field of theoretical speculation than as an artistic medium, reflections on it contributed to the transformation of art from a material object into a process. Dematerialized information replaced the traditional work, the act of creation itself became a process of data exchange between systems – creativity entered the sphere of cooperation with algorithms. Nevertheless, as the researcher emphasizes, AI mechanisms still operate in a hidden way, which is why their influence on culture and aesthetic perception

remains partially invisible. The key issue, however, remains the human being. Understanding the human-computer relationship in art is not only a matter of technology, but also of deep reflection on who we are as creatures creating and receiving meaning.

A slightly different perspective of aesthetic experience is emphasized by Lilianna Kozak, who points to its radical transformation in the digital era – from static reception to interactive, individualized participation. The researcher points out that already in the 1950s, the development of a scientific and technical revolution began, which led to the transformation of culture into interactive software that not only provides content but also enables its co-creation. Gradually, the user gained independence in decision-making in the matter of navigating the work, the online platform transformed into a framework for art, and aesthetics began to redefine the way of contact with the work. According to the Author, aesthetic experience retains its authenticity regardless of the environment – digital or material. Technology, especially in fields such as bioart or robotic art, is becoming a tool of transgression – a medium for transmitting the process of experiencing the world from a perspective other than human.

The post-seminar issue ends with two texts that are reflections on potential or imagined threats resulting from the development of technology. Ewa Wójtowicz explores the issue of cloud computing, which is a symbol and real infrastructure of the modern world, and at the same time a significant subject of artistic reflection. Its aesthetics, built on apparent immateriality, mask the real, physical background: data centers, fiber optic cables, cooled server rooms – all of this is part of the new extractivism, exploiting the earth, energy and human attention. “Art has a long tradition of dealing with the invisible, the elusive and the imagined,” writes the Author, indicating that it is becoming one of the main tools for demystifying digital infrastructure. The projects operating at the interface from the border of art and critical research cited in the article show how artistic imagination can reveal the political and ecological consequences of technology. Aesthetic experience in this context is a deeply cognitive immersion in processes that usually remain invisible. Through critical cartography, technological metaphors and performances, artists allow us to “see the cloud”. In this way, art not only comments on reality, but actively participates in its reconfiguration, offering alternative ways of seeing and understanding the world hidden behind the interface.

Joanna Szczepanik, on the other hand, proposes a reflection on one of the key phenomena of modernity: the fear of technology. The Author combines philosophical, sociological and cultural perspectives to examine the growing fears accompanying the development of modern technologies – from artificial intelligence to the automation of everyday life. The figure of HAL 9000 – the famous computer from the film *2001: A Space Odyssey*, symbolizing the crossing of the boundary between man and machine, is at the center of

the considerations. This figure becomes the starting point for a broader analysis, encompassing both the contemporary movement of neo-Luddism and earlier visions of technological threats present in literary texts and ideological manifestos. The article tries to understand the sources of technological anxieties, by taking into consideration various modes of experience: a sense of loss of control, exclusion, alienation, indicating that technological anxiety is not only a technical problem, but also a cultural and existential one.

Aleksandra Łukaszewicz

 <https://orcid.org/0000-0001-6961-9037>

Polish Society for Aesthetics

aleksandra.alcaraz@gmail.com

THE PROCESS OF VIRTUALIZING PUBLIC ART: QR GRAFFITI, ART IN AUGMENTED REALITY IN PUBLIC SPACE, AND GRAFFITI CREATED IN VR

Abstract

The virtualization of public art, which I approach as art in public space, street art, and graffiti, can be viewed from one side as its medialization, that is, a mediation of reception through media images functioning online. This process makes our experience of these art forms virtual in terms of their potentiality. On the other hand, the virtualization of public art can be approached as a process of gradually transferring it into the virtual space. In this second case, virtual space constitutes, if not the foundation, then at least an equal element of artistic realizations. These realizations are increasingly manifesting themselves primarily in a digital form, although each time in a physical space, which gradually loses its significance, undergoing hybridization. The process of virtualizing public art is illustrated by referring to examples of graffiti made in the form of stencils with artistic QR codes. Then, I point out artistic projects that explore the city by searching for contemporary art objects in the form of augmented reality, located in selected and marked areas on a map. As the final examples, I mention the work of Kenyan artists who create and promote the creation of graffiti in virtual space.

Keywords:

public art, street art, graffiti, medialization, virtualization, hybridization of public space



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INTRODUCTION

Public art is a concept that encompasses various phenomena of an artistic and aesthetic nature, the vast majority of which are characterized by positive aesthetic values. For this reason, although site-specific realizations, installations, sculptures in public spaces, as well as performances, happenings, and graffiti may be included¹, other types of urban images are excluded, namely those images or signs and traces left by vandals².

The transfer of public art into virtual space is an extremely interesting phenomenon that began with its medialization. It is often surprising, especially considering that public art is defined by the urban environment in which it occurs, an environment that for most of its history has had a physical character. However, it should be noted that the virtualization of public art is linked to the virtualization, or rather hybridization, of public space. This space has not only a physical character but also a digital, online layer, and these layers intertwine, connect, and refer to each other in various ways. The hybrid form of public space exists due to the interconnection of two ontological layers: the physical and the digital.

Art encountered by people in public spaces must be accessible while moving through the city. Therefore, its fundamental characteristic is direct intervention in the urban fabric. This feature remains intact in the situation of hybridizing public space, where the urban fabric undergoes transformation. In technologically developed urban environments, we move through physical streets and digital networks, which constitute part of the fabric of contemporary cities. Therefore, the art we encounter, while still spatially located in the physical sense, is no longer always and exclusively subject to physical space, undergoing increasing virtualization, analogous to the virtualization of our lives.

In the area of public art that I am reflecting on, I will focus on graffiti and street art, additionally including some works in augmented reality (AR), which, if they were realized in physical space, would have the status of sculptures. I will, however, exclude the issue of performance, its documentation, medialization, and transformation under the influence of communication techniques, not due to theoretical divergence but because of the divergence of the research material, which should be (and is) subject to separate and thorough analysis (Jankowska, 2004).

¹ *Public Art*, after Tate Gallery [official website]. Available at: <https://www.tate.org.uk/art/art-terms/p/public-art> [Accessed: 3.04.2025].

² Signs and traces left by vandals can be collectively treated as urban images, i.e., images created in the urban environment in public space, both legally and illegally, critically and commercially. I have written about this in more detail in the text “Urban images: street-art, graffiti, and vandalism – in the context of Arnold Berleant’s aesthetics of environment” (Łukaszewicz-Alcaraz, 2017, pp. 653–661).

However, it is the performative aspect that connects all the cases of public art discussed in this text and left aside, because not just performances and happenings per se, but also graffiti and street art are not only visual but, above all, performative in nature³. Then, the AR and VR realizations I refer to are also defined by their performative context in both creative and receptive aspects. Of course, a broader framework for the performativity I mention could be outlined, as even classical works of art – such as paintings, sculptures, or architectural objects – require psychosomatic engagement from both the creator and the recipient, as Arnold Berleant has repeatedly pointed out in his development of the Aesthetics of Engagement⁴. However, such a broad theoretical framework would not allow for the isolation of a specific subject of study that I wish to focus on.

MEDIALIZATION OF STREET ART AND GRAFFITI

The medialization of street art and graffiti, that is, the mediation of the reception of this type of art through images functioning within the framework of the latest communication technologies, although problematic from the perspective of their characterization as being based on intervention in urban space, has been continuously progressing since the moment the first photograph of an image created on the walls of public urban space was taken. Andrea Baldini, a contemporary researcher of this phenomenon who does not cease to recognize the subversive potential of these urban images despite their transfer into media or gallery spaces, emphasizes the importance not only of their popularization through the latest communication technologies but also the transformation of the forms of engagement with them that these technologies provoke:

The existence of those photographs is not secondary, parasitic, or an uninteresting epiphenomenon when we get to the appreciation of street art. Quite in contrary. Those documents constitute our primary access to works of street art. This in turn suggests the epistemic and ontological primacy of the “reproduction” over the “original”. For its constitutive link with the city, street art’s digital media revolution had then affected how we perceive, experience, and conceptualize public places (Baldini, 2020).

³ The argument in this direction has been developed in the following texts, gradually clarifying my understanding of urban images: Łukaszewicz-Alcaraz, 2014a, pp. 7–9; Łukaszewicz-Alcaraz, 2014, pp. 38–45; Łukaszewicz-Alcaraz, 2016, pp. 9–23.

⁴ Counting it from at least the time of the publication of the book *Art and Engagement* (Berleant, 1991) and in Poland, from the time of the translation of *Re-thinking Aesthetics: Rogue Essays on Aesthetics and the Arts* (Berleant, 2004) into Polish (Berleant, 2007).

Baldini, when defining graffiti and street art, treats graffiti as the most radical form of street art (Baldini, 2018, pp. 9–10), whose critical, subversive character brings it closer – sufficiently in his view – to critical art (Baldini, 2022). This move allows the Italian aesthete to acknowledge the possibility of presenting graffiti in galleries and art museums without losing its specificity, although he points out the problematic nature of this gesture, often criticized for “domesticating” graffiti through its institutionalization, which deprives it of its essential subversiveness (Austin, 2010; Bengtson, 2015). By considering graffiti as a type of street art, Baldini approaches it differently than I do, as I view works created in the urban area as various examples of urban images – some of them constituting examples of public art – of a different aesthetic engagement character, requiring either a posture with less cognitive orientation and more contemplative traits, as in the case of graffiti, which is more focused on somatic involvement, or sometimes with more, as in the case of street art, whose aesthetic values and content necessitate an intentionally cognitive posture, i.e., one focused on understanding (Łukaszewicz-Alcaraz, 2017). Such a distinction leads to a differentiated approach to their gallery exhibition possibilities, which accepts the presentation of street art in this form but rejects the presentation of graffiti – except through documentation⁵.

I certainly agree that the presentation of graffiti and street art in art galleries, such as the exhibition “The Bridges of Graffiti”, which featured the works of ten artists: Eron, Futura, Doze Green, Todd James, Jayone, Mode2, SKKI ©, Teach, Boris Tellegen and ZeroT was organized by the Fondazione de Mitri and Mode2 as a side event to the 56th Venice Biennale, which also received UNESCO patronage, significantly contributes to raising their status and also influences reconsidering the role and place of the museum towards making it a place open to different perspectives and critical discussions (Baldini, 2017, p. 28). However, in my opinion, such social advancement of graffiti is paid for by the dilution of the meaning of this art, which is alive in the streets. Such price is not to be paid when it is not the artists exhibiting graffiti-style works or originating from graffiti environments/ experiences but rather works documenting their creations made in public spaces, as in the exhibition curated by Pietro Rivasi in Modena titled “1984. Evoluzione e rigenerazione del writing,” which took place in 2016 and presented many photographs and videos of graffiti and street art

⁵ Such a distinction is fundamentally consistent with Baldini’s thought, who, as a leading example of the possibility of presenting graffiti in a gallery-museum format, analyzes the exhibition curated by Pietro Rivasi in Modena titled “1984. Evoluzione e rigenerazione del writing,” which took place in 2016 and had a largely documentary character. However, Baldini draws broader conclusions from this, stating that “museumization does not necessarily mean the domestication of graffiti” and does not strip it of its subversive character (Baldini, 2017, p. 28). Nevertheless, the presentation in the form of documentation of various social phenomena in an art gallery is not the same as the possibility of these phenomena being present in galleries per se.

images (Salad Days, 2016). The gallery advancement of “street art” is problematic for the very form of its existence, but its medialization does not pose such a threat, remaining external to it. Medialization is also more understandable in the broader perspective of the ongoing transformations of public space.

The first form of medialization of art is its documentation, which has gradually developed over the past century. Its beginnings can be traced back to the appearance of the illustrated press, whose primary form of illustration in the 19th century was woodcuts (Kita, 2015), which by the end of the century were gradually replaced by photographs and photographic collages⁶. Photography and photographic reproduction are not the same, as photography achieved the status of art⁷, while photographic reproduction by definition does not aim to achieve this and usually does not⁸.

The photographic popularization of art, which is fundamentally unreproducible, as discussed by Walter Benjamin in the 1920s and 1930s, is an appropriate reference for understanding the character and role of photographic reproduction in graffiti and street art (Benjamin, 1975, pp. 75–76). Benjamin's thought, rooted in the philosophy and theory of culture defined by historical materialism, indicating the role of technological changes in production means for artistic practice changes, remains relevant today and facilitates understanding of the transformations in artistic practices and forms of artistic consciousness that have developed since the invention of technological forms of imaging. The first step in this process was the mechanical reproduction of images that previously existed, which achieved a level of execution suitable for reproducing works of art around 1900. It was at then that the connection between the original and a specific time and place in space, which provided the possibility of experiencing the aura, an integral quality of a work of art that cannot be transmitted through mechanical reproduction techniques, was broken for the first time (Benjamin, 1975, pp. 69–72).

⁶ A wonderful book dedicated to photomontage, in which the theme of the presence of photomontage in the press from the first half of the 20th century is developed, was published by Stanisław Czekalski (2000).

⁷ The path to recognizing photography as art was bumpy and twisted with various turns, from attempts to resemble romantic painting, while painting itself became more progressive with Impressionism, through gaining recognition as an independent art with the acceptance and emphasis placed on specifically photographic properties and possibilities in the movement of New Objectivity. This process included a crucial moment when the exhibition *The Decisive Moment* by Henri Cartier-Bresson was displayed at the Louvre, that is, at the metaphorical Parnassus of art, and then underwent various modifications, moving away from analog photographic qualities towards digital painterliness and visionariness (Soulages, 2012, p. 270).

⁸ An exception can be the story about the necessity of documenting performances from the perspective of the possibility of their historical recording, which gradually evolved towards becoming an equal medium in video performance (Jankowska, 2004).

Benjamin, not only a materialist cultural theorist but also a communist, viewed the change that occurred with the development of technical forms of reproduction as justified because it aligned with material changes in history, stemmed from them, and had a more egalitarian character. However, he did not idealize the processes occurring, noting that every transformation is not merely the addition or subtraction of something but a transformation, i.e., a change, in the process by which one dimension is enhanced while another weakens. In the case of art reception, its popularization and the expansion of its audience beyond the previously educated elite who had access and the ability to travel and personally experience the original works of art is associated with a flattening of its reception. A similar situation occurs in the case of both photographic documentation of graffiti and street art, as well as, in a broader perspective, with the influence of technological media on the transformation of these forms of imaging, originally related to the public sphere.

The documentation of graffiti or street art is not the same as the graffiti and street art themselves and fundamentally changes the way they are received, although it undoubtedly allows a greater number of people to become familiar with the visual aspect of the works in a representational form. The visual and representational popularization of urban images, which are part of art experienced in the natural conditions of the material, physical urban environment, which has been the primary form of public space at least since ancient times, flattens the reception of these images, which, at least potentially, are perceived by a greater number of senses. In their perception within the physical urban environment, the smell of paint, and the goosebumps that appear on the body when we pass through an unknown area containing graffiti, which we do not fully perceive at the moment of being focused and searching for its critical meaning, are essential.

Sharing images of urban works, first in the form of analog photographs and later digital ones, on websites and social media undoubtedly increases the popularity of the person or people who created them. It also sometimes has political significance – as is the case with works by Banksy or the famous image of the Hooded Man, analyzed in its various transformations, including media transpositions, by W. J. T. Mitchell (2011) and Orayb A. Najjar (2011). However, what is taken away from these images is their essential dimension, Benjamin's "aura," understood as the feeling of a certain distance, which occurs despite the relative closeness of the object and results from the genetic connection between the original and a specific place and time, which is extremely important in the case of urban images. Due to the transfer of urban images into the space of digital images, they are removed from the continuity of physical space, lose their uniqueness and temporality, and gain infinite reproducibility and potential immortality on servers. Their uniqueness and ephemeral character are replaced by superficial repetitiveness outside of specific

social, political, and economic significance and potential digital eternity. They are freed from the process of struggles and conflicts that define a given social environment and which, in relation to them, can be treated as their “tradition,” gaining exhibition value.

This, however, is only one side of the coin of the ongoing technological transformations that affect images and, more broadly, art created in urban spaces, leading to the emergence of new forms of these images and this art in a form that can no longer be easily reduced to the original physical form, though retaining an essential element – a creative and/or critical approach to public space. However, in order to fully understand this process, we must briefly turn our attention to changes in the public space itself, which occur as a result of material transformations in means of production – broadly speaking – and technological media – more specifically.

HYBRIDIZATION OF PUBLIC SPACE AND ITS RELATIONSHIP WITH PUBLIC ART

Artistic practices, such as creating works of art in public space, including street art and graffiti, are carried out in the urban social environment of a public nature, which, however, undergoes rapid processes of privatization in the era of late capitalism. Graffiti opposed the privatization of public urban space at the end of the 20th century, later leaving this task to vandalism and post-vandalism (Moch, 2016, p. 62), while street art, sculptures, and installations entered and continue to enter into various alliances with private spaces and objects, as well as spaces subject to social forms of management. Graffiti production expressed attempts to reclaim public space that had been, and was being, appropriated by private entities, which is why slogans such as “RECLAIM THE STREETS” emerged (Ramirez Blanco, 2013). On the other hand, works falling under the street art movement were and are generally created with the consent of residential communities, private entities, or local government institutions, which, by supporting art, simultaneously protect their own interests by beautifying unattractive or degraded buildings that are not yet being demolished (Moch, 2016, pp. 141–142). (Through their actions, they – for better or worse – contribute to the processes of gentrification (Grochowska, 2013, pp. 149–158)). The specificity of sculptures and installations, in turn, forces an even closer relationship with regional and supraregional authorities. This affects, on the one hand, the production of works defined in terms of content and meaning in agreement with these entities, and on the other hand, it requires these entities to understand the significance of contemporary culture and art if the works are to be executed in this spirit.

When analyzing the changes occurring in art practices in public urban spaces, including their gradual virtualization initiated by mediatization processes, it should be noted that they are fundamentally linked to the transformations affecting the urban environment and public space itself. Many theorists, especially since the beginning of the 21st century, have pointed out the influence of virtual technologies on their progressing hybridization (di Marino, Tabrizi and Chavoshi, 2023, p. 6). Hybridization, which cities undergo, is largely the result of the digitization of various areas of life and relies on new connections between urban neighborhoods, people, digitization, and spaces for work and leisure. It is also related to changes in the division between the public and private spheres. The area where public life takes place is a specific area of social life, which can include various urban public spaces such as streets, parks, or squares. In this area, relations with both friends and strangers take place, as well as actions that largely, although not exclusively, define social life (di Marino, Tabrizi and Chavoshi, 2023, p. 7). The ability to present oneself, express oneself, and be heard in public social space has conditioned the recognition of an individual as a subject (rather than merely an object) of politics since ancient times. This public space used to have a physical nature. However, it began to lose this nature with the development of the press (Benjamin, 1975, p. 52), radio, and television (McLuhan, 1964; McLuhan, 2004), which enabled feedback, i.e., allowing recipients to actively participate in the creation of public debate conducted through media, thus also in the production of media messages.

Gradually, from the moment the mediatization of public debate began, we reached an advanced hybridization of social space, which is no longer just physical but also no longer exclusively public. The hybridity of social space involves, on the one hand, the blurring of the boundaries between physical and digital spaces, occurring through the use of mobile technologies as social devices, because the social environment is shaped by the mobility of users connected to each other and to others, also with space via mobile devices. As Adriana de Souza e Silva writes, “[a] hybrid space is a conceptual space created by the merging of borders between physical and digital spaces, because of the use of mobile technologies as social devices” (de Souza e Silva, 2006, p. 266). Social media, for example, can influence the attractiveness of a restaurant in the neighborhood, which had previously been overlooked by local residents. In this way, they participate in the process of spatial negotiations in the urban environment, integrating the layers of this environment: the physical – where one can have a meal – and the digital – where one can share the experience of that meal. Noticing these processes, the authors of a text dedicated to the hybridization of the city, and particularly places of work, using Oslo as an example: Mina Di Marino, Helyaneh Aboutalebi Tabrizi, Seyed Hossein Chavoshi, point to three dimensions that define the hybrid nature of contemporary urban spaces: spatial-functional, social, and digital, while the interaction

between these dimensions is connected with the complexity of what is private and public, with blurred boundaries between public, semi-public, and private spaces, as well as being linked to the network, which reconfigures hybrid urban spaces, being simultaneously embedded in it.

The interaction between spatio-functional, social, and digital features is related to the complexities of the concepts of public and private as well as the network in which we would reconfigure and embed hybrid urban spaces (di Marino, Tabrizi and Chavoshi, 2023, p. 6).

Physical proximity does not necessarily mean availability, the public nature does not necessarily relate to physical matter, interaction does not require immediacy or spatial contact, and informationality is not necessarily tied to text or words. This situation has led to the creation of hybrid patterns of urban life, neighborhood relations, and social practices (Hampton, 2002, pp. 228–231), which have far-reaching consequences for the ways in which urban spatial structures are shaped and for their dynamics. This is something urban planners, architects, and city designers must take into account today.

Hybrid spaces are connected, mobile, and social spaces (Castells, 2002, pp. 116–136), which, therefore, are defined by a second aspect of their hybridity: they cross the boundaries between the private and public, enabling, for example, civic engagement in urban space from a distance defined by one's place of residence on the outskirts rather than in the city center, or even outside the city. This process has been ongoing for several decades, but it intensified significantly since the COVID-19 pandemic, which accelerated these processes. This has been reflected in theoretical and analytical texts, as well as previously in political and economic guidelines, as the development of remote work significantly reduced lockdown costs in developed countries, while also helping to reduce the spread of the virus (OECD, 2020).

Currently, the urban social space is an environment in which we move using both physical bodies and various mobile applications on smartphones or, at least in some cases, in VR or AR goggles. What is physical and what is digital intersect with one another, not by simply adding, but by merging. The digital requires some form of physical materiality to manifest, and the material is increasingly mediated digitally. This mutual intertwining of the physical and digital can be understood through the concept of the evolution of nature and culture, in which it is recognized that what is natural influences what is cultural, and what is cultural influences what is material. The mutual relationship between what is natural and cultural in highly developed cities is also observed, both in terms of their urban and architectural shape, and the social functions they fulfill (Jones, 2009, pp. 309–323), because, on the one hand, although contemporary cities are built from highly processed materials, these materials are still extracted

from the earth, and on the other, human communities implement their relationships within them, determining forms of their existence on both biological and cultural levels.

In order to reflect on the consequences of the transformation of urban space for social practices, including artistic practices carried out in this space, it is worth referencing the perspective of historical materialism applied to the analysis of cultural phenomena, as referred to in the previous section of this article by Walter Benjamin. This Marxist theorist of culture did not limit himself to analyzing the widespread access to works of art, which before the development of machine reproduction techniques had an elitist nature. He also pointed out other consequences of the basic thesis of historical materialism in the realm of culture and art practices related to the transformation of the material base, which results in the emergence of new practices and, therefore, new forms of consciousness (Benjamin, 1968; Benjamin, 1999). This process was also indicated by Canadian sociologist Marshal McLuhan, who in *Understanding Media: The Extensions of Man* (first published in 1964) argued that the type and form of media are significant, and even more significant than the content they convey, as they shape and control the scale and form of human associations and actions, and ultimately their consciousness, which is an expansion of the meaning of his famous slogan *The Medium is the Message* (McLuhan, 1964; McLuhan, 2004).

The mediatization of artistic practices in urban public spaces is just one element of the process of changes occurring due to changes in the material base, which is no longer just physical, but becomes both physical and digital, that is, hybrid. The hybridization of practices, including artistic practices, carried out in urban social spaces, which are no longer entirely private nor entirely public, nor only physical, but connect what is physical with what is digital, is a natural stage in the development of these practices in accordance with the theses of historical materialism. This leads to the creation of new ways of understanding and acting in space and society, which is particularly visible in the case of technologically advanced urban environments. In these environments, we observe processes of creating new forms of civic engagement and urban interactions based on various forms of intervention in the urban and public space through artistic, visual, spatial, and performative realizations, connecting two ontological levels of the reality defining these cities – the physical and the digital. Hybridization leads to new forms of interaction within the local community through the functioning of individual places, their remote animation, and the creation of temporary online communities. It is no surprise, then, that new practices built on a transforming material base result in new forms of consciousness and social identity. The way societies shape and define space is changing, as well as how they shape themselves through their functioning in professional, interest-based, family, friendship, neighborhood, and creative groups.

Artistic realizations created in this situation in urban social spaces are a kind of reformulation, “nodes” of a physical and technological nature, connecting two layers of social reality: the physical and the digital in an unexpected way, potentially reconfiguring the expectations of people moving within the city and network. They create a new type of “common places,” which can also be called “places in between,” built on an unforeseen solution to technological and infrastructural urban conditions (Setti, 2013; Crotti, 1997). It is worth noting that their aesthetics are not only based on visual accessibility but on informational accessibility. It is precisely this accessibility – the ability to easily move from a small physical intervention to information suspended online – that defines their public nature, maintaining their character as public art – now realized in a hybrid urban environment.

VIRTUALIZATION OF ART IN PUBLIC SPACES AND STREET ART AS THEIR TRANSFER TO VIRTUAL SPACE

At the beginning of the article, I pointed out the fundamental and essential connection between graffiti and street art with public space and the urban environment. Initially, this space and environment had a physical character, which was gradually lost due to the media-driven discourse. The medialization of discourse began during the era of print press, then television, later evolving into stages leading towards websites and social media. Mass communication media began relatively early to involve the audience in the process of interaction and co-construction of discourse, through the publication of letters from readers and directing the television camera at them. However, it wasn't until the mid-1990s, when communication reached the so-called “2.0” level, that we encountered a situation in which public space was democratized to such an extent that amateurs were widely included in the process of creating messages functioning in culture, regardless of the physical place they occupied or their nationality (Lessing, 2006). In the first decade of the 21st century, social media began to develop, continuing the democratization process of public space on the web⁹, as well as the Internet of Things, conceptualized within the framework of 3.0 communication. This stage of communication’s technological development, based on the growth of wireless networks, cheap microcontrollers, cloud computing, etc., creates connections between places, objects, and people, often referring to terms like cross-media or communication bridges. These bridges, or

⁹ Social media, by their nature, are less subject to the pressure of centralized and thus ideologized mass media, which, however, does not mean that there are no possibilities for manipulation through algorithms that promote certain types of content due to potential corporate profit.

intersections of physical and digital roads, often house works of art in public spaces, including street art and graffiti.

Changes in communication media understood as the transition from communication 1.0 to 3.0, facilitate the reception and enhance the popularity of graffiti and street art, as I mentioned earlier, citing Andrea Baldini's reflection. However, their consequences are more far-reaching than those noted by the Italian theorist. On the one hand, there is the phenomenon of unverifiability observed in communication, both text-based and image-based (not only static images but also moving ones). In other words, verification of such communication through direct reference to reality becomes difficult and sometimes even impossible. Since the first media war, namely the Gulf War known to most of the world through media reports, which Jean Baudrillard wrote about convincingly (1995, 2006), we have reached the precession of simulacra (1994, 1996) and post-truth, which he predicted. It thus becomes impossible to simply confirm whether someone truly said the words attributed to them, just as it is impossible to determine whether a certain event occurred – including the event of painting a picture on the city's walls. What proliferates instead are images of images, which refer to each other in a network of mutual relationships, but it becomes difficult, or even impossible, to say whether this image was actually created. This is particularly relevant for images on city walls, which by their nature are more or less ephemeral (Moch, 2016, p. 80). Therefore, art made in public spaces changes its face. The aesthetic form or the content of the physical images themselves is no longer the most important – moreover, they are increasingly difficult to create in the increasingly commercialized space of large urban agglomerations with buildings made of glass and steel, as convincingly described by Sepe, a Polish graffiti artist and street artist, in the video dialogue he had with Yuka, a Mexican colleague, as part of the “Breaking Walls with Graffiti” project (Łukaszewicz-Alcaraz, 2014). The transformations to which the urban environment is subjected, both in terms of physicality and the ways of moving through it and communicating within it, heavily mediated by digital tools, lead to changes in practices of intervention in this environment and public space.

Since, currently, public space is not just physical, and much of it exists online, graffiti and street art are also increasingly transitioning to virtual forms. This is the other side of their advancing mediatization, which is not just external, i.e., spreading already created works, but also internal, influencing the substantial transformation of their structure in line with the new media architecture of 3.0, based on bridges and intersections of the physical and the digital. Virtualization of graffiti and street art does not necessarily mean their complete transfer to digital form, although we are also dealing with this form. In the commercialized and socially degraded public space of urban environments, graffiti and street art undergo physical reduction, while the importance of what

is digital grows, thus making them hybrid, in the previously defined sense. Minor interventions in the physical urban space act as references to analogous places in the digital space, between which bridges are set up, offering us the experience of art in public space, including graffiti and street art.

An excellent example of the physically reduced form of graffiti and street art, which refers to digital spaces, both containing images and music, is the form created using QR code stencils. This form is especially preferred in cultural areas where graffiti is treated more severely, both socially and legally, than in Western countries and the Americas, such as in Japan, China, or India, though its reach is not limited to these countries. One of the first graffiti works in QR code form, which is also an example of street art, was created by Yuri Suzuki in Tokyo in 2008 and was called “Future Pirate Radio.” Based on graffiti in the form of a QR code, it referred to an audio form – pirate, not under authority, and critical of the dominant discourses, thus continuing the subversive character of graffiti and street art in a changed technological form within a transformed technological environment.

REMO (Remo Camerota), an Australian artist living in Tokyo, created another famous work in 2010 using a QR code in a public space in Bristol. It was his campaign called *The Scar Graffiti campaign*, referring to his graphic novel *SCAR Vol. 1*. The QR codes, spray-painted and placed in various locations around the city, were prepared for reading by British telephone devices. When scanned by phone, they referred to an audio piece called *Graffiti Piece of Alice* within *SCAR Vol. 1*. The QR code, made in the form of graffiti, acted in this case as a kind of signature, which was also a link to the rest of the work. Graffiti made in the form of a QR code but referring to further spaces created by artists can be considered transformations of street art, linking streets and spaces through creative nodes.

The works discussed above use QR codes created with stencils and spray paint. However, the QR code form is also made from other materials, such as mosaics. This material was chosen by Space Invaders, who installed QR code mosaics in various cities, such as in Varanasi (India 2008): VRN_12, QR code (Invader2006 (2008), or in Brussels (Belgium 2012): BXL_40. In the latter case, the QR code referred to moving images, specifically an animation showing an invasion of the city. However, the QR codes from Space Invaders usually led to messages such as “this is an invasion,” „nice art,” „I love you,” or “not for sale,” highlighting their anti-systemic character.

Creating artistic works in this way is an example of transformations in the forms of creation that are not reducible to the dissemination of graffiti works in media, even in social media. It is evident that transformations in material bases are still transforming practices, and the emergent forms of consciousness based on them, regardless of whether the materiality is solely physical or hybrid. The form of media communication, therefore, influences the reformulation of

the ways we experience, associate, think, and feel. These forms are increasingly being moved to virtual space, which does not mean the complete loss of their physical substrate, but its fundamental reduction. This is also evident in other artistic works, even those that are not rooted in illegal or anti-systemic practices, as is the case with graffiti. Limiting the focus to graffiti could create a misleading belief that their “hiding” in the digital space is a result of an attempt to escape the practices of power. However, it might be considered to be opposite. Already Slavoj Žižek, in *The Plague of Fantasies*, first published in 1997, wrote that in the network we can also experience the continuation of the Law of the Father in the network (Žižek, 1997; Žižek, 2001). Since, according to this law, we are currently experiencing the progressive disembodiment of what characterizes human experience, and art presented in the public space of cities, public art, is increasingly taking the form of a partially virtual, hybrid, or augmented form.

The number of projects using AR (augmented reality) technologies is currently increasing, whether we look at downtown Frankfurt, Germany, where from October 22, 2022, to June 30, 2024, one could find site-specific works realized in the interesting project *The Anlage*, involving Tanya V. Abelson, Benedikt Ackermann, Florian Adolph, Alex Chalmers, Shaun Motsi, and Kristin Reiman¹⁰; or in Timișoara, Romania, where the Android ArtTM app was developed and launched, focusing on enhancing the experience of existing works and monuments found in physical space (Vert, Andone, Vasiiu, 2019); or in Nairobi, Kenya, where the Greek company Narratologies team taught students at Kenyatta University how to create urban games using photogrammetry and AR as part of the CAPHE project¹¹. Gaming-related artworks, discovered while traversing the city through a mobile app, are becoming increasingly popular, enriching the way we move through the city and changing the form of experiencing art by activating audiences in both mental and physical engagement. Since public space is often perceived through media mediation

¹⁰ Tanya V. Abelson (*1985, Buenos Aires, AR) – created digitally experienced music for imported plants, which marked a path in the Nizza garden: “Tambourine” (2021). Shaun Motsi (*1989, Harare, ZW) – presented a virtual tree inspired by the film “Avatar” in the middle of the Nizza garden: “Untitled” (Nu Sensitivity, 2021). Alex Chalmers (*1991, Whangarei, Aotearoa/NZ) – placed a digital elevator cabin appearing among surrounding skyscrapers: “Untitled” (2022). Benedict Ackermann (*1994, Frankfurt, DE) – provided the possibility to identify plates on sidewalks, beneath which cables connect in a system using a program based on Artificial Intelligence: “Embedded systems” (2022). Florian Adolph (*1977, Marburg, DE) – digitally revealed two massive sculptures in the Nizza park: “Paper and Steel” (2019). Kristin Reiman (*1992, Tallinn, EE) – placed two digitally connected speakers on a small hill to activate the work: “How to unfocus completely” (2022).

¹¹ *Narratologies AR Treasure Hunt Closing Event in Nairobi, Kenya* [official website of the CAPHE project], <https://www.caphe.space/narratologies-ar-treasure-hunt-ecodream-hunts-a-closing-event/> [Accessed: 7.04.2025]

today, and social interactions through various technological interfaces, it is understandable that art is increasingly and more widely created in the space between what is physical in the city and activating images on screens, and what is suspended in the cloud. The images that appear on bridges between the physical and digital worlds manifest on the surfaces of screens, only to disappear, temporarily inhabiting our bodies and requiring us to at least briefly embody them, to give us an embodied experience, even though mediated through digital media.

In our bodies and through our bodies, we also experience fully virtualized graffiti images. This confirms Hans Belting's assertion that the primary location of images is the human body (Belting, 2007, p. 35), despite his skepticism about the status of images of digital images (Chmielecki, 2016). Virtual graffiti is painted in programs like Tilt Brush through goggles and remains on digital walls, visible only to intentional recipients. This is surprising but understandable when we see where it happens, because these are usually countries where there is not so much a lack of graffiti legalization, which is not globally widespread, and not that much of its social acceptance either. Therefore, young people practicing it, who want to raise important social issues or create works in graffiti style, agree with the criticism of graffiti as the destruction of private or public property and create works that, in their opinion, ensure the coherence of their artistic message – works that do not destroy physical public space but are available in virtual space. Such works are created, for example, by the Nairobi Fat Cap group – Fallohide and Baraza Media, which are initiatives in Nairobi, Kenya, focused on training artists in virtual reality graffiti, aiming at social goals, visibility/audibility of artistic messages, and the need to assert the presence of African artists and tell their stories in the emerging virtual world, without the need for critical historical dialogue. This approach is very interesting, showing a difference from the critical approach dominant in the Global North, which is deeply skeptical about the global nature of digital networks, virtual reality, and the Metaverse project in detail.

PROVISIONAL SUMMARY. TECHNOLOGY, AESTHETICS, AND ETHICS IN THE AGE OF THE FOURTH INDUSTRIAL REVOLUTION

Contemporary artistic practices in AR (augmented reality) and VR (virtual reality) environments clearly demonstrate the interconnection between technological, social, aesthetic, and ethical issues. These technologies provide new creative possibilities, enabling artists to engage in social issues and use digital spaces to convey their values. In the context of this transformation, the issue of the hybridization of public space stands out. Traditional physical spaces, such as urban streets, are beginning to coexist with virtual spaces, creating new

forms of interaction with the public. The hybridization of public art, including street art and graffiti, has become one of the key elements of this change. Street art, traditionally existing in physical space, is entering the digital realm. QR and VR graffiti, and AR public art, are just a few examples where traditional art forms meet modern technologies, expanding public space with new, digital layers. As a result, urban space becomes more complex, blending physical and digital elements which together create a new, hybrid public space that is more dynamic and interactive.

The core value of contemporary artistic practices in AR and VR is accessibility. Broad access to digital spaces democratizes art, making it more accessible to various social groups worldwide. Artists who use these media can reach a wider audience and influence social change, creating works that transcend the boundaries of traditional physical spaces. This phenomenon could lead to greater inclusivity in culture, becoming one of the key elements of the Fourth Industrial Revolution. Kurt Iveson rightly notes that graffiti and street art are practices that enable urban residents to reclaim their right to public space (2009). In the age of digital technologies, such an approach evolves, and traditional forms of street art become part of a global, virtual space, giving artists new tools to express their ideas and participate in global social and cultural processes. In this way, the hybridization of public art, combined with modern technologies, becomes one of the most important elements of contemporary artistic practice, participating in the process of merging physical and digital space into one dynamic ecosystem.

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PROCES WIRTUALIZACJI SZTUKI PUBLICZNEJ: QR GRAFFITI, SZTUKA W ROZSZERZONEJ RZECZYWISTOŚCI W PRZESTRZENI PUBLICZNEJ ORAZ GRAFFITI VR

Streszczenie

Wirtualizacja sztuki publicznej, przez którą rozumiem sztukę w przestrzeni publicznej, street art i graffiti, może być postrzegana z jednej strony jako ich medializacja, zapośredniczenie odbioru poprzez inne obrazy medialne także funkcjonujące online. Sprawia ona, że nasze doświadczenie tych rodzajów sztuki ma charakter wirtualny w sensie jego potencjalności. Z drugiej strony do wirtualizacji sztuki publicznej można podejść jako do procesu stopniowego przenoszenia jej w przestrzeń wirtualną. W tym drugim przypadku przestrzeń wirtualna stanowi, jeśli nie podstawę, to przynajmniej równoprawny element realizacji artystycznych. Te realizacje coraz częściej przejawiają się przede wszystkim w sposób cyfrowy, choć każdorazowo zachodzi to w pewnej przestrzeni fizycznej, która niemniej jednak stopniowo traci na znaczeniu, co ma zasadniczy związek z przekształceniami zachodzącymi współcześnie w przestrzeni publicznej. Wskazany proces wirtualizacji sztuki publicznej obrazuję odnosząc się do przykładów graffiti wykonywanego w formie szablonów z kodami QR o charakterze artystycznym. Wspominam również projekty artystyczne polegające na odkrywaniu miasta poprzez poszukiwanie obiektów sztuki współczesnej istniejących w formie rozszerzonej rzeczywistości w wybranych i zaznaczonych na mapie lokalizacjach. Jako ostatnie przywołuję przykłady działania artystów i artystek kenijskich, którzy tworzą i popularyzują tworzenie dzieł graffiti w przestrzeni wirtualnej.

Słowa kluczowe:

sztuka publiczna, street art, graffiti, medializacja, wirtualizacja, hybrydyzacja przestrzeni publicznej

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Sylwia Szykowna

 <https://orcid.org/0000-0002-4943-2539>

Adam Mickiewicz University

szykowna@amu.edu.pl

WHEN MACHINE AND HUMAN MEET. ART IN THE AGE OF ARTIFICIAL INTELLIGENCE

Abstract

This article touches on the issue of human-technology relations in the age of artificial intelligence. It poses questions about the changes that have taken place in the field of art under the influence of advanced machine learning systems. The last decade of AI's successes enforces the need to rethink the aesthetic categories, including an attempt to redefine the place and role of the artist in a technologically determined reality. The cited historical examples of aesthetic reflection accompanying computer art of the 1960s largely anticipated the changes taking place today, while also serving an important metacritical function. Today's critical AI art can play a key role in raising awareness of the processes taking place and uncovering the workings of artificial intelligence algorithms, which are often locked in black boxes and their operations and assumptions inaccessible to human understanding.

Keywords:

artificial intelligence, aesthetics, human-computer interaction, computer art, postproduction, posthumanism



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INTRODUCTION

Nature still outdoes the machine and you helped prove it!
(Astray, 2024)

In June 2024, multidisciplinary artist Miles Astray submitted a photograph entitled *Flamingone* to the prestigious 1839 Awards competition in the Artificial Intelligence category. The surreal image of a headless flamingo taken in Aruba in 2022 won the third place, also receiving the People's Vote Award. This would not have attracted much public interest, had the photograph not in fact been a documentary one, captured without the use of AI systems. In that case, the artist's subversive gesture became a paradigmatic example of an inverse Turing Test, whereby an image obtained using a camera deceives the viewers by asserting its technological "artificiality". This kind of duplicity is reminiscent of the Mechanical Turk, an automaton created by Wolfgang von Kempelen in 1770, which simulated a mechanical, inhuman intelligence; meanwhile, it was a talented chess player hidden inside who made the successive moves on the chess board.



Fig. 1. M. Astray, *Flamingone*, 2024. Photo courtesy of the author.

The case of *Flamingone* is interesting in many respects. Given the current, extremely heated debate surrounding the dynamic development of artificial intelligence systems and the use of machine learning in artistic practices – and more broadly in culture – Miles Astray's award reflects a watershed in human-machine relations. State-of-the-art AI systems are not only capable of mimicking human cognitive activities, but also automate creative processes which thus far have been an exclusively human province, provoking even more social resistance as a result. The fact that AI-generated content may be indistinguishable from the work of a human undermines the long entrenched Romantic vision of art understood as the quintessence of humanity, manifesting in the ability to create unique and original things that is inherent only in humans, (Schelling, 1983). The example of *Flamingone* may be cited along other high-profile and well-known works such as *Space Opera Theatre* by Jason Allen (2022) or *Pseudomnesia: The Electrician* by Boris Eldagsen (2023), which test the limits of human creativity by challenging the myths that have grown up around it. They raise questions about the nature of art and its authenticity in the age of AI (See Krewani, 2024; Szykowna, 2024).

Is the computer monitor today's equivalent of a painter's canvas, paintbrush, or a chisel, a meta-tool which replaces musical instruments while having access to all of humanity's knowledge? It is difficult not to acknowledge the creative capacities of the computer when it effortlessly imitates the styles of the great masters by painting another Rembrandt portrait (*The Next Rembrandt*, 2016), composing Bach cantatas (*DeepBach*, 2016) or completing Beethoven's unfinished Symphony No. 10 (*The Beethoven AI Project*, 2021). Despite such spectacular achievements, artificial intelligence is still very human, dependent on the anthropocentric viewpoint, encumbered by our prejudices which in turn inform its actions. These are still human hands, decisions and choices that shape its development (Crawford, 2021). The media hype surrounding the advances in artificial intelligence makes it all appear more autonomous than it actually is. After all, despite considerable technological sophistication, machine learning systems are not autonomous creative subjects, and entities independent of the human artist which display meta-artistic reference to its creation, nor do they reflect on their actions. Projects concerning the emergence of strong or general artificial intelligence (AGI) resulting in the so-called technological singularity still remain within the realm of speculative narratives, fabricated and amplified by the corporate tech giants that fund its development (including companies such as Google, Amazon, Meta or Microsoft) (Coeckelbergh, 2020). Consequently, the media-fuelled fear of artists being replaced by artificial intelligence seems unfounded, or certainly premature. The previously cited photograph by Miles Astray raises an even more important question than those asked so far in the public debate around artificial intelligence. It concerns the place and role of the human in the new creative environment dominated by

artificial intelligence systems. Indeed, understanding our relationship with technology is key to functioning better in this complex reality, with its increasing ascendancy of algorithms.

An analysis of earlier reflection on the creative use of machines – dating since the late 1950s – offers an interesting context for the present-day AI debate, thanks to which the complex aspects of technological transformation may be better understood. Computer art and the discourse it involved reflected changes in aesthetics and art, suggesting ways to adapt to the new conditions of human functioning, with the premise of *Man-Computer Symbiosis* (Licklider, 1960). Initiated at the time, the process of going beyond the humanist dimension of creative processes gave rise to complex ecologies in which the contemporary human participates. This study will attempt a critical look at such relations, revealing the technological entanglement in the processes that constitute our lives today. Being aware of those processes is one of the major social challenges facing the contemporary human.

GENEALOGIES OF THE NEW AESTHETICS

If these pictures were done by use of a computer, how could they possibly be art. The idea was ridiculous! Where was the inspiration, the intuition, the creative act? What the heck could be the message of these pictures? They were nothing but black straight lines on white paper, combined into simple geometric shapes. [...] A fake, from start to end, christened as art ...! (Nake, 2002, p. 6).

It is late January 1970, the 67th discussion forum “Opinion Against Opinion” is taking place at the Werner von Siemens School in Düsseldorf. The smoky, packed auditorium witnesses a meeting of two significant figures of the then cultural world, who espouse completely different perspectives and visions of the development/concepts of art. Max Bense, influential philosopher of science, originator of generative aesthetics, and Joseph Beuys, member of the international group Fluxus, author of the concept of social sculpture, discuss creative provocation, the idea of creativity, emphasizing irreconcilable differences of approach to artistic practice. The former’s neo-Cartesianism, lined with existentialism, clashes with the latter’s alchemical and anthroposophical thinking. The black and white television footage captures the heat of the conversation, conveying the spirit of the time when “art was something important, and engaged discussion demanded sweat and effort” (Pias, 2007, p. 115). Bense fiercely defends the rationalist, mathematical conception of art, attacking the extended definition of the work of art by Beuys, who argues that everything is aesthetic and accumulates in what is human. Both contend the very anthropocentric figure of the artist, who is limited by the horizons of their own

beliefs and entangled in a network of socio-political dependencies. Where Beuys's idea of art fiercely holds on to the human, Bense's responses delve into the premises of creativity that speak of the human limitations, of what is diffuse and subject to ideological, material factors. "If Beuys won this debate", it was only because there was no room yet in the *Zeitgeist* that he represented for the post-human, technological critique (Pias, 2007; Stewart, 2020).

The discussion cited above was more than just an aesthetic dispute involving representatives of two different worlds (Snow, 1999). That situation was emblematic of the collapse of the modernist project, which was strongly linked to technological development. The modern world would not have emerged without the technological progress which revolutionized all parameters of human life. Driven by the notion, modernism valued machines highly, not only in view of their role in production automation, but above all as an important symbol of the ongoing changes. Futurism was a prime example of such a sentiment, appreciating the energy of technology and modern life. By the 1960s, "the mental attitude of aesthetic modernism had grown old", as Jürgen Habermas observed (Habermas 1996, p. 50).

In the 1970s, the earlier enthusiasm about the rise of the computer's cybernetic capabilities gave way to a technosceptical mood among the public, underpinned by the growing fear of increasing dehumanization and technocracy. The student movement of 1968 embraced unfettered actionism, dominated by the spontaneous models of neo-avant-garde art, which gradually lost interest in technological experimentation that would develop away from the artistic mainstream. That historical parting of ways is well described by Edward Shanken in *Contemporary Art and New Media-Digital Divide or Hybrid Discourse?* (Shanken, 2016).

Max Bense and the artistic-scientific milieu around him – the proponents of information aesthetics (Bense, 1969), affiliated mainly with the University of Stuttgart – saw its relevance slowly wane. The progressive aesthetic views developed jointly with Abraham A. Moles, which drove an exuberant artistic practice in which computer technology was a new medium of artistic expression, were becoming obsolete. The highly controversial theory, informed by the concepts of Charles Morris, Charles Peirce's semiotics, Claude E. Shannon's strictly technical information theory, or Chomsky's generative-transformational grammar aimed at rejecting subjective impressions and opinions in favour of objective rationalism, faded into oblivion, irretrievably losing its utility in terms of knowing.

In the 1960s, the influential theory of information aesthetics inspired artists to create new art based on scientific methods and aesthetic experimentation that integrated technology into the creative process, calling the ideal of human creativity into question. The Stuttgart school became the cradle of computer art, the seedbed of the "algorithmic revolution", becoming known over time as the

“digital Bauhaus” (Ehn, 2002, pp. 18–28). However, the heroic attempt to combine art theory with Norbert Wiener’s cybernetic theory found little recognition with the artistic community of the time, for whom the computer was no more than a soulless and mindless tool incapable of creating “true” art. The vision of art as a purely human activity that cannot be automated or programmed was emphatically asserted in the debates. The widespread technophobia denied the pioneering creations by Georg Nees, Frieder Nake, Michael Noll or Bela Julesz the status of works of art. Ultimately, the attempts to have computer art – formally conventional yet innovative since it involved programmable machines in the creative process – acknowledged in its own right failed.

One could say that the meeting between Max Bense and Joseph Beuys somehow symbolically ends the difficult “digital decade” in art (Walewska-Choptiany, 2021). In hindsight, it was not the artistic value of the works created by the pioneers of computer art but the theoretical reflection accompanying its inception that proved to be more important. As Edward Shanken underlines, the meta-critical process,

challenges the systems of knowledge (and the technologically mediated modes of knowing) that structure scientific methods and conventional aesthetic values. Further, it examines the social and aesthetic implications of technological media that define, package and distribute information (Shanken, 2001, p. 304).

The search for new applications of the computer in the domain of artistic creation was accompanied by the need to devise corresponding aesthetic/cognitive models that would anticipate the inevitable changes. Thus, Bense’s reflection paved the way for a new notion of art that went beyond the human confines, leading to the emergence of new posthumanist ecologies over time.

FROM OBJECT ART TO INFORMATION: JACK BURNHAM’S AESTHETICS OF INTELLIGENT SYSTEMS

*We are now in transition from an “object-oriented”
to a “systems-oriented” culture (Burnham, 1968, p. 31).*

The cover of the catalogue for *Software: Information Technology: Its New Meaning for Art*, the exhibition held at New York’s Jewish Museum in 1970, features an interesting photograph. A colony of gerbils lives a computer-controlled habitat filled with small cubes whose position would change in response to environmental stimuli. Towering over everything, a mechanical robotic arm programmed by the artists automatically moved the metallic blocks, responding to the modifications made by its inhabitants. Animals often

interfered with that system, introducing their own arrangements. The work of Nicholas Negroponte and The Architecture Machine Group that he headed at MIT explored the responsive capabilities of artificial intelligence by testing the effects of its implementation in an artificial environment managed by the rodents (Burnham, 1970). As intended by the authors, the experiment tested the dialogue between the two systems in a closed feedback loop of communication, focusing on the design of humanized technologies to stimulate the emergence of symbiotic living spaces understood as cohabitation of intelligent species (Negroponte). The works were displayed at the Jewish Museum exhibition following a meeting between Nicholas Negroponte and Jack Burnham, an influential artist and art theorist who was a fellow at the Center for Advanced Visual Studies at the Massachusetts Institute of Technology from 1968 to 1969. There, the future curator of *Software: Information Technology: Its New Meaning for Art* became interested in a new field, in which researchers studied the capabilities of information systems, computer networks, believing artificial intelligence to be a technology of the future. That remarkably important – especially in retrospect – exhibition showed works that relied on systems and processes and involved paradigms of communication and cybernetics by means of which individuals could interact with one another and their surroundings. They dovetailed with a new vision of art that developed since the 1960s, moving away from the finite material object towards dematerialized information. *Software: Information Technology: Its New Meaning for Art* not only aimed to showcase technological art but also highlight the rapidly expanding electronic environment whose impact on the creative process engendered the need to redefine previous aesthetic categories, as it challenged the idea of an artwork understood as a material object. Curator Jack Burnham asserted in the catalogue:

(...) the goal of *Software* is to focus our sensibilities on the fastest growing area in this culture: information processing systems and their devices. (...) Thus it may not be, and probably is not, the province of computers and other telecommunication devices to produce art as we know it; but they will, in fact, be instrumental in redefining the entire area of aesthetic awareness (Burnham, 1970, pp. 10–11).

Taking up two floors of the Jewish Museum, the exhibition brought together pioneers of new media art, including Ted Nelson, Nicholas Negroponte, Roy Ascott, Les Levin or Nam June Paik, and prominent conceptualists, including John Baldessari, Vito Acconci, Hans Haacke or Joseph Kosuth. In effect, the conceptual and processual nature of the works came prominently to the fore in this unique, combined display of creations. *Software...* became a symbol of an encounter of two, seemingly disparate visions of thinking about and doing art which, as it turned out, came to share one idea (Shanken, 2001). In his

Aesthetics of Intelligent Systems, Burnham discussed the contiguity of computer programs and “dematerialized” conceptual art, underlining the communicative aspect of art (Burnham, 1970a). Unlike the numerous art and technology exhibitions that took place between 1966 and 1972, which explored aesthetic applications of the technological apparatus, *Software...* pursued the ideas of “software” and “information technology” as metaphors for dialogic art. For instance, *Cybernetic Serendipity* (Institute of Contemporary Arts, London 1968) or *The Machine at the End of the Mechanical Age* (Museum of Modern Art, New York 1968) prioritized showy machine-based experiments that demonstrated their capacity to mimic human creative skills. Meanwhile, Burnham’s exhibition emphasized the processuality of art, and its entanglement with the complex systems of contemporary life, in which technology played an increasing role (See Walewska-Choptiany, 2021).

Although the exhibition itself drew critical reviews, mostly due to the unreliable equipment which generated additional costs for the organizers, it undeniably and incontrovertibly contributed to formulating new concepts of art. It would be legitimate to say that *Software...*, just as Jack Burnham’s aesthetic texts – *The Systems Esthetics* (1968) and *Real-Time Technologies* (1969) – anticipated the systems- and information-reliant future of new interdisciplinary art forms that would function in environments governed by contemporary information-processing and communication frameworks (Burnham, 2015). The new understanding of art that Burnham propounded was directly linked to the scientific and technological evolution that fostered the transformation of the human sense of the aesthetic:

Although the art of the future could take any one of a number of directions, it seems to me that, with the steady evolution of information processing techniques in our society, an increasing amount of thought will be given to the aesthetic relationship between ourselves and our computer environments – whether or not this relationship falls into the scope of the fine arts (Burnham, 1970a, p. 95).

At the time of the first mainframe computers, he predicted a far-reaching human interaction with technology, understood not so much as a tool but as an information system directly prompting the transformation of social and cultural structures. For Burnham, such technologies represented an entirely new form of aesthetics:

The continued evolution of both communications and control technology bodes a new type of aesthetic relationship, very different from the one-way communication of traditional art appreciation as we know it. (...) the “aesthetics of intelligent systems” could be considered a dialogue where two systems gather and exchange information so as to change constantly the states of each other (Burnham, 1970a, p. 96).

The aesthetics of intelligent systems that Burnham advocated was yet another step in the long history of changes in art, initiated by Duchamp and his ready-mades, driven by conceptualism, minimal and cybernetic art, all of which sought to assail the tradition-hallowed work of art understood as a finite object of contemplation. Introduced into the domain of aesthetics, the notion of a “system” nurtured the relational dimension of the work of art, causing the latter to become dematerialized, to change into a process, communication, information, an element of discourse. In this new vision of art, the artist no longer produces a material object but creates complex, creative ecologies based on networks, interactions and exchanges. This opened the way to new forms of creative practice, while destabilizing our understanding of authorship in the age of artificial intelligence systems.

Contemporary culture is increasingly mediated by information, information systems, algorithms and artificial intelligence, fundamentally affecting the modalities of acting and being in the world. Burnham’s texts show how past ideas laid the groundwork for how art is understood today. It has been more than 50 years since the *Software...* exhibition, during which time technology has been advancing continually to cross ever new boundaries. Information has become the primary medium of the 21st century, permeating every aspect of contemporary artistic practice, the works created and the supporting art systems (Goodfellow, 2024).

AI IS HUMAN AFTER ALL – TOWARDS AN ARTIFICIAL AESTHETIC

Our world is becoming entangled – so much of our consensus reality is being created by the software we hardly understand (Ridler and Sinders, 2021).

AI is Human After All is an art project developed by Anna Ridler and Caroline Sinders in 2019–2021 as part of a residency at Ars Electronica, European ARTificial Intelligence Lab in Linz. Their main objective was to understand and explain the latent mechanisms of AI systems, as well as show the necessary human work involved in creating and implementing such systems. The artists’ critical approach to technologies is also palpable in the present-day debate concerning the dynamic development of machine learning algorithms and the changes they induce in the art field. The new possibilities of generative AI give rise to numerous social, ethical or political challenges, calling their widespread implementation into some doubt.

In recent years, technologies have made a giant leap forward, pervading life without a trace yet so thoroughly that the fears surrounding their development are in no way unwarranted. Thus, Mark Weisers’s 1991 prediction in the prophetic text *The Computer for the 21st Century* has come true:

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it (Weiser, 1991).

Many of the technologies available today used to be a pure speculation; now, they are becoming our daily experience. In the original vision of artificial intelligence from the 1950s and 1960s, reflected in the aforementioned aesthetic texts by Max Bense or Jack Burnham, the main challenge of the technology was to teach the computer to perform a range of cognitive tasks that only humans were capable of. Six decades later, AI systems are a key tool in modern economies, automating a range of activities, including the processes of creation and making (Manovich, 2019). While AI systems have been in development for decades, the increased computing power and data availability, along with the application of a new deep learning architecture, described most fully in the landmark paper *Attention is All You Need* (Vaswani et al., 2017), has exponentially increased their use, compounding our concerns about the place of humans in the new ecologies of modern life (Goodfellow, 2024). Today's creator is enmeshed in increasingly complex networks of production, which renders the essential questions of authorship in the age of AI more and more problematic (Goodfellow, 2024; Zeilinger, 2021). Such dispersed *modus operandi* encompasses both AI infrastructure, inclusive of the massive technological toolbox, hardware, software, the data that feeds it, as well as the unseen labour of those who label and catalogue the data used to train algorithms. In this context, Martin Zeilinger speaks of “posthumanist agential assemblages” that involve

decentred, relational, and contingent subject positions, with the effect that questions of agency and cultural ownership are reconfigured beyond anthropocentric horizons (Zeilinger, 2021, p. 30).

The new logic of human-machine collaboration he proposes does not presuppose elimination of the human subject, but “recalibrates it in relation to the ecologies in which it shares” (Zeilinger, 2021). In this new arrangement, the artist no longer creates aesthetic and conceptual objects, but assumes the role of their interpreter and curator instead (Goodfellow, 2024). The changes taking place in the art domain had already been noted by Nicolas Bourriaud in the 2002 book *Postproduction. Culture As a Screenplay: How Art Reprograms The World*. According to the latter author, the practice of exploiting previous works by other authors or products of contemporary culture in the shape of digital data rather than any “raw material” to produce a work of art had been dynamically increasing since the early 1990s. In his opinion, the art of post-production seems to have been a response to the “the proliferating chaos of global culture in the

information age” that yielded a new order of space, in which a DJ and a programmer selects ready-made cultural objects and inserts them into new contexts:

[...] how can we produce singularity and meaning from this chaotic mass of objects, names, and references that constitutes our daily life? Artists today program forms more than they compose them: rather than transfigure a raw element (blank canvas, clay, etc.), they remix available forms and make use of *data* (Bourriaud, 2002, p. 23).

The creative strategies described by Bourriaud followed the methodological tradition of Duchamp’s “use of objects”, later continued by Pop Art artists (Andy Warhol, Claes Oldenburg, James Rosenquist), New Realism (Martial Raysse, Raymond Hains, Jacques Villeglé) or appropriation artists (Sherrie Levine, Barbara Kruger, Jeff Koons). Their work, Bourriaud argues, represented the first stage in the evolution of the idea of post-production. This was followed by the remix-based art of the 1980s and 1990s which, taking advantage of the more widespread access to computers, promoted DJ culture and the related practice of “use of forms”. Under such a typology, we are most likely witnessing the subsequent stage, in which those are the generative systems of artificial intelligence, fed either consciously (contracts, consents) or unknowingly (data scraping) by data from various sources, which drive present-day cultural production. Currently, artists operate in thoroughly different circumstances, determined epistemologically (non-human turn) and technologically (commercialization of AI systems), guiding us towards entirely new ways of seeing and creating. Nowadays, algorithmic and cybernetic systems shape almost every aspect of life, precipitating changes in the domain of art were non-human actors also make important contributions to the relational and multidimensional understanding of the human and the reality in which they operate. This complex dimension of cultural production is well reflected in Eduardo Navas’s concept of metacreativity, construed as a

cultural variable that emerges when the creative process moves beyond human production to include non-human systems (Navas, 2023, pp. 141–142).

This transformation proceeds gradually, allowing the entry into another meta-order, where

the artist no longer produces the algorithm, itself, but rather writes a computer program that will take on a creative process according to parameters written by the artist (Navas, 2023, p. 142).

According to Navas, AI aesthetics consists in “the sense of perception that emerges in relation to the automation of cognition” (Navas, 2023, p. 245). This

definition by no means recognizes the machine as an autonomous and independent creator capable of any aesthetic reflection. It does not grant superior privilege to

humans, or machines, but rather exposes what aesthetics has always been: a discourse of engagement with the world that the human subject projects onto nature as an 'other' to be territorialized (Navas, 2023, p. 245).

AI systems change the forms of this engagement diametrically, mediating them through analogue, digital as well as intelligent media that become an interface between us and the world, the others, our memory and imagination: a medium through which the world speaks using the engine it runs on. Due to AI expansion, the mechanisms of artificial intelligence remain hidden or covert, so that the extent of their entanglement in our lives is not realized. In this new environment, critical AI art (Anna Ridler, Caroline Sindere, Kate Crawford, Memo Akten, Mario Klingemann, Trevor Paglen, Nora Al-Badri, Przemysław Jasielski among others) and the aesthetic theory developing around it (Manovich and Arielli, 2021–2024; Żylińska, 2020; Navas, 2023; Zeilinger, 2021) may play a key role in raising awareness of the processes taking place out of sight, uncovering the workings of AI algorithms, which are often locked in black boxes while their operations and premises are beyond human grasp. The previously mentioned art project by Anna Ridler and Caroline Sindere represents the kind of inquiry undertaken in a new field of critical research on artificial intelligence, i.e. Human-Centred AI (HCAI) or eXplainable AI for the Arts (XAIXARTS), thanks to which technology may be made more transparent and comprehensible to humans (Bryan-Kinns, 2024).

CONCLUSIONS

In a *Letter to a Young Artist* included in the book *Artificial Aesthetics: Generative AI, Art and Visual Media*, Lev Manovich writes:

The key difference between me, a human, and generative AI: I am limited, but AI is unlimited. (...). What makes art "human" is not our intentions, plans, ideas or meanings. (...) The only relevant thing is our limitations. Our inability to compete with the superhuman. With the web, with search engines, with recommendation engines, with huge databases, with machine learning algorithms, with Generative AI – and other super-human computer technologies to come (Manovich and Arielli, 2021–2024, pp. 140–141).

In his critique of artificial intelligence systems, he goes further, claiming that AI will in no way help develop human creativity. Thus, he recommends nurturing

our species limitations. In an era of dynamic development of artificial intelligence systems, the project of human alienation promoted by Manovich seems misguided. In addition, it seems to contradict the posthumanist perspective developed since the 1980s, which sees humans as part of a complex ecosystem. When we look at the history of art more broadly we will see that art has always been technological and emerged in what we can call “networks of human tools” (Żylinska, 2020, p. 55). The process of going beyond the humanistic horizon is well illustrated by the historical examples cited in this article of the aesthetic reflection developed over time accompanying art using the computer as a medium of artistic expression. The attempts made at the time were by no means about eliminating the human subject, but an attempt to define new conditions for its functioning.

The history of human-computer relations dates back to the 1950s, which saw the first visions of future artificial intelligence systems inspired by the enduring project of modernity. Computer art explored the potential of new technologies, seeing an opportunity to transcend the anthropocentric myth of creativity. The accompanying aesthetic reflection on the new artistic practices largely anticipated the changes that would take place in the field of art. In retrospect, it may be said to have played a very important metacritical role, facilitating adaptation to the circumstances in which technologies would become an integral part of everyday life. Today’s artificial intelligence systems permeate every aspect of human life, transforming our experience of the world and our being in it. In this new arrangement, the human is at once a distinct and embodied subject as well as an element in complex ecological and technological systems, whose understanding helps one to function better.

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KIEDY SPOTYKAJĄ SIĘ MASZYNA I CZŁOWIEK. SZTUKA W DOBIE SZTUCZNEJ INTELIGENCJI

Streszczenie

Niniejszy artykuł porusza kwestię relacji człowiek-technologia w dobie sztucznej inteligencji. Stawia pytania o zmiany, jakie zaszły w polu sztuki pod wpływem zaawansowanych systemów uczenia maszynowego. Ostatnia dekada sukcesów AI wymusza konieczność przemyślenia kategorii estetycznych, w tym próbę redefinicji miejsca i roli artysty w zdeterminowanej technologicznie rzeczywistości. Przytoczone historyczne przykłady refleksji estetycznej towarzyszącej sztuce komputerowej lat 60. XX wieku w dużej mierze antycypowały zachodzące dziś zmiany, pełniąc jednocześnie ważną funkcję metakrytyczną. Dzisiejsza krytyczna sztuka AI może odegrać kluczową rolę w podnoszeniu świadomości na temat zachodzących procesów i odkrywaniu pracy algorytmów sztucznej inteligencji, które zamknięte w czarnych skrzynkach, są niedostępne ludzkiemu zrozumieniu.

Słowa kluczowe:

sztuczna inteligencja, estetyka, interakcja człowiek-komputer, sztuka komputerowa, postprodukcja, posthumanizm

Liliana Kozak

 <https://orcid.org/0009-0008-1658-991X>
Independent Researcher
alfair8@o2.pl

THE BEGINNINGS OF THE TRANSFORMATION OF THE AESTHETIC EXPERIENCE OF ART AT THE TURN OF THE 20TH AND 21ST CENTURIES

Abstract

What is the experience of the digital revolution? We experience being in an expanded space of contact, AR and VR. The development of genetics, the possibility of interfering with the DNA of the organism has influenced works in the field of bio art. Man has excluded technological creations from the scope of nature, distinguishing part of his specificity as so different that he needs acceptance of his own activity. The experience of art is a certain shared manifestation of being, intersubjective, specific to man. Part of this experience is related to the specific time of creation and reception of a given creation. An attempt to capture the current change in experience, a certain atmosphere shared by the latest changes in art, using pioneering tools of science, is not only a possibility to answer the question about the current identity of the contemporary recipient, participant of the network. It is a search for a common direction of future works of art, technological inventions, imagining and building an environment that responds to the current need of art, to what kind of being we want to design for ourselves.

Keywords:

aesthetic experience, robotic art, biorobotic art, ARTEX



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The time of the scientific and technological revolution began in the 1950s, and as a result, digital spaces were created that have their own visual language, symbols, such as a floppy disk, which for the younger generation is a symbol of the “save” command, the older generation remembers its use. When Lev Manovich noticed that the *QuickTimePlayer* program had a designed interface to resemble a video player, it was 20 years ago, the interfaces of modern programs still refer to the image icons created at that time (Manovich, 2001). In this way, technology is adapted to remembered forms of communication. According to what the researcher proposes, culture is interactive software created by us to live. In texts from the 1970s, there is a process of transferring attention to the recipient, which is caused by the intensive development of computer programming languages at that time. Through the use of hypertext, the web user creates their own text, their own multimedia navigation path, their own usage strategy, the programmer is particularly sensitive to creating a software tool that allows free movement, intuitive understanding while learning both the new tool and the created information path.

Electronic space is a composition of certain, specific forms in which art galleries also open up. In the composition of forms, further compositions open up. The entire space of the internet platform becomes a frame for aesthetic experience, a frame in which one can move, approach its boundaries, examining one's own distance, and participation in the process. This is a type of space that has been built and it can be expected that the aesthetic experience associated with it changes its character, its other aspects appear, such as presence at a distance, mediation, submission, the feeling of being absorbed by electronic spaces, which affect the contemporary recipient of art.

The frame is overlapping, is it a computer, Oculus, or is an avatar part of it? Where and when does the electronic performance take place, connecting participants from different time zones? How does the phenomenon of art occur when the author is an algorithm, how then to define the framework of the event? Are the chatbot - ChatGPT and the AI program - Midjourney a framework, co-author, tool, or do they replace the creator?

GABERBOCCHUS COMMON ROOM

One of the places where reflection on the possibilities of AI arose in the 1950s was the Gaberbocchus Common Room, founded in London in 1957 by Stefan and Franciszka Themerson in the basement of the Gaberbocchus Press publishing house (Reinhardt, 2011). In this place, invited artists and scientists held discussions, integrated, and inspired each other. Stefan Themerson did not believe that exact sciences and, on the other hand, art and the humanities were separate cultures that found it difficult to conduct a dialogue, as C. P. Snow

pointed out in his book *Two Cultures and the Scientific Revolution* in 1959. Moreover, C. P. Snow himself soon revised his views, writing four years later about the mediating third culture. In 1958, during one of the Thursday meetings of the Gaberbocchus Common Room, the mathematician Irving John Good considered the possibility of a machine that would not only have a self-modifying program, but would be so complex that it would respond in a way that resembled human thought, so that it would be able to interact with humans as equal conscious beings (Bostrom, 2011; Good, 1965). When such a creation was created, Good concluded that it would be the last invention of humanity. The scientist suspected that such a machine would soon make more extraordinary discoveries than its creator.

THE BEGINNINGS OF ARTISTIC ACTIVITIES IN THE CONTACT SPACE

Tim Bernes-Lee developed the concept of hypertext, it was awarded in 1995 at the Ars Electronica Festival, in the category of Interactive Art (Hirsch, 2019). The principles of the then created award for the World Wide Web, such as the creation of communities, virtual identity, impact on society and artistic quality were some of the many issues discussed at that time. The computer and the network connection were commented on by artists and associated with art even before their creation.

Douglas Davis and Nam June Paik in the 1970s carried out artistic activities connecting via satellite, in 1979 the Interplay project appeared. After Interplay, its authors Bill Bartlett and Robert Adrian X organized and implemented one of the first systems of connecting computers with e-mail for artists at the turn of 1979/1980, the Artist's Electronic Exchange System or ARTEX.

The Canadian-Austrian artist Robert Adrian X became the author of the third project at Ars Electronica 1982 *The World in 24 Hours*, connecting 16 cities on three continents, the ORF Regional Television Studio became the centre of the activities. The artists used a telephone modem, which allowed connections between computers, a fax machine, and connected via telephone lines, via SSTV, which allowed images to be transmitted between them by radio. The event lasted from noon to noon the following day, in Central European Time.

For this activity to take place, the related restrictions had to be respected, using this type of media of contact was expensive and difficult to access. The project included connections from Florence, Amsterdam, Toronto, Tokyo, Hawaii, and Turkey, from which the group of artists Minus Delta T travelled to Bangkok. Heidi Grundmann, director of ORF Kuntradio, anticipated from the beginning a lack of interest from the public. This was due to the fact that the project did not envisage an external display, yet here it was already possible to notice that the authors of the works, the works and their recipients function in

a different way. This caused the action to influence other creators, the nature of interactive multimedia art.

The connection enabled the exchange of thoughts, ideas, communication. The project *The World in 24 Hours* was for Adrian X a communicative sculpture. This happened before the Internet and its specific social media. What Adrian X wanted to enable with ARTEX was a dialogue between artists leading to the search for human meaning in electronic space, this became the motto of one of the centers of transformation of electronic art and the Ars Electronica festival in the Austrian city of Linz (Hirsch, 2019).

The project initially didn't arouse public interest, which was in line with the predictions of the project founder Heidi Grundmann, long-time director of ORF Kunstradio (Hirsch, 2019). This project required participation, there was no "outside" show, only a process of continuous exchange. It was also a departure from the typical division into the author of the work, the audience and the work. Over time, however, the project turned out to have an influence on future generations of artists, showing the developing direction of activities, including interactive activities and through media

The ARTEX network becomes a tool in the next project *La plissure du text* from 1983, of which Roy Asott becomes the originator and moderator. This time the connection is established in 14 stations, 11 cities in Europe, Australia and North America, 24 hours a day, between December 11 and 23. Each of the centers told a story from the point of view of a specific person at the time corresponding to it. Symbolic figures known from fairy tales and legends, e.g. a magician, a cat, a princess or an old sage, created a narrative that turned out to be as diverse as verbal stories, none of the connection points had a full version of the record, the multiplied stories were different depending on the center (alien.mur.at) (www.medienkuntz.de). Roland Barthes wrote a book *Le plaisir du texte*, here we have *la plissure*, a braid that refers to the pleasure (*le plaisir*) of creating a narrative (lpdt2.blogspot.com). Stories, transmitted information used to be non-linear, non-identical, dependent on the creative will of the storytellers or witnesses of the event. This is also hypertext, the visual form of a dynamic information tool that seems immense and eludes control. The user of the network is a traveler, he can lose his way, but to find it he does not have to know the entire creation he is moving through. Over the course of several decades of its formation, virtual space was created along with reflection on whether it would absorb users, whether it would become more attractive than the rest of the environment, it turned out that not for everyone, attachment to the body, movement, prevails.

But going back to the beginnings, the Adrian X network, what we managed to achieve thanks to the ARTEX network is to show the direction that the entire community will follow, becoming an information society. Currently, activities

that required so much effort are part of everyday life. Did artists using the ARTEX network have the impression that they had in their hands a tool that would change the structure of everyday life, and that people would become data transmitters, fulfilling a strong need to share what surrounds them, even without fully understanding the content being transmitted? I understand the social digital connection here not so much as a transformation, but as the direction in which we were consistently heading.

VIRTUAL WORLDS

Since 2003, the virtual world Second Life has existed, it has undergone many graphic transformations, has its own currency, is a meeting place, games are gaining more popularity than virtual worlds, apparently much more encouraging even a very flexible, but still scheme of action, competition and the lack of the need to look for other people to spend interesting time.

In Second Life, the duo Eva and Franco Mattes created under the name 0100101110101101.ORG.9. As part of the *Reenactments* series of actions (2007-2010), using avatars, they recreated five selected performance actions important in 20th century art. They tried to recreate the basic situation, the original action as faithfully as possible, because the change resulted from the medium itself. The virtual space showed the action in a different context, the performer did not so much lose his corporeality as he gained another immersive form, his corporeality on the other hand, one could say, was in a sense “outside”, it is mediated, incomplete, but also expanded. The participants of the show could interact with the performance by having their avatar in Second Life, they could not do it outside of that place, because that was where the show was taking place. The artists were at the show only in the virtual space, there was no live meeting. The events have their own documentation, there is a sound and image recording, also a recording of the chat, which is an integral part of Second Life.

The activities referred to by the duo include: *The Singing Sculpture* (1969) by the pair Gilbert & George, *Imponderabilia* (1977) by artists Marina Abramović and Ulay, or *Seedbed* (1972) by the performer Vito Acconci, *Shoot* (1971) by Chris Burden, and *Tapp und Tastkino* (1968–1971) by Valie Export and Peter Weibel.

Later, virtual worlds such as AltSpaceVR, Spatial, VRChat were created, they have 3D graphics adapted to virtual reality glasses such as Oculus, where there is also a speaker and microphone, which simultaneously read the movement of the upper body, head and hands, which allows for more free interactions, this is equipment not connected to a computer. The latest virtual worlds also allow for a hologram to be displayed in this reality, then the participants are visible in a very realistic way, they are not replaced by an

animated avatar. Perhaps it is only a matter of time before the graphics of these worlds, and the impact on other senses, allow for such a realistic illusion that they will become much more common in use, and more economically available. In May 2021, the first scientific conference in Poland took place, taking place in the immersive space of AltspaceVR, allowing participation in VR glasses – virtual reality. It was called Wirtualium and was organized by Academia Electronica and the Section of Philosophy of Technology of Students of the Philosophy Students' Scientific Club of the Jagiellonian University. During the conference, there was an opening of an exhibition of oil paintings, the space allowed for a virtual walk, you could walk through the paintings, float in the air. In virtual reality glasses, you can experience the works of artists in a different way than before.

In 2022, the Wirtualium 2.0 conference took place in the electronic space Spatial, where screens appeared streaming the image from one filled room to another. The screens also showed the content of the chat to people wearing Oculus, which shows the specific limitations of this reality. Various functions are available depending on the device used, but experienced users can compensate for them, in this way, thanks to others, a person in Oculus can see the chat, even though it is not in the virtual reality glasses, it is available on the computer and on the smartphone.

Augmented reality has emerged, which may have even greater utility potential, because it does not separate virtual space from everyday, unmediated space, and its participation in everyday life is sometimes not even noticeable. This area of reality appears, for example, when reading a barcode in a store, contactless transactions, using pens with a touch panel tip, and gloves with material parts that allow you to navigate your smartphone in them.

Presence takes on a special meaning, more and more often we go or drive somewhere relying on an application, we are a marker on a digital map and only then can we find a new place. Whether we are more of a point on the map or a specific moving body, the body of the digital avatar that we take on on the screen also comes into play, or the body of the avatar that has a very strong impact on us when we put on virtual reality goggles. Before such glasses were even used, clothes disappearing due to an error turned out to be extremely embarrassing, and the reaction of identifying with the character on the screen was very strong. Performance actions always particularly touch on identity, when the artist becomes their own prop. In the performance in the virtual world, which is an interpretation of a non-digital prototype, in the shows of Ewa and Franco Mattes, one could observe whether the often very controversial prototype still arouses deep anxiety or embarrassment, whether the recipient remembers that he is sitting on a chair in front of the screen. Selecting and imitating known actions shows that we need a connection, the digital space is not completely different and distinct, and can even allow for precise documentation of what we

cannot forget in art and culture. Therefore, the failure of a social network is currently a fear of losing part of the digitalized “I”, which can be increasingly used against a member of society who has become a user of the network-transmitter and it is less and less possible to distinguish what is and is not digital, what are the sources of information that surrounds us and where the image of the world that we build comes from. The aesthetic experience, regardless of the environment, digital or non-digital, is always true, emotions always “touch” and leave a lasting mark.

COMPOSING ALGORITHMS AND DIGITAL FLOWERS

Portrait of Edmond de Belamy (2018) was created by artificial intelligence trained by Obvious, a collective based in Paris. It was sold at auction at Christie’s in New York for \$432,500. It used a set of GAN (generative adversarial network) algorithms.

The name *Blomenveiling* (2019) means flower market, it is a work by Anna Ridler and David Pfau, an application built on the Ethereum blockchain – DIY Nifty Gateway. The work was put up for sale, the project involved bots that boosted the price during the auction. Virtual flowers were designed to wither a few days after purchase, just like real ones.

It turns out that what is durable is not the most attractive; transience, fleetingness, and delicacy is more valuable, and we prefer to follow someone, and a bot will be just as effective. The goal of the achieved durable graphic has already faded, so the seeker of a work of art is looking for something that is harder to obtain, that escapes the power of possession. Where will following bots lead us, let's hope that they are always in the power of programmers.

The already historic, first algorithm creating compositions is AARON (1972–2016) by Harold Cohen (Kluszczyński, 2016). He has been creating painting compositions since the 1970s, using a generative artificial intelligence program. The black and white works became colorful in the 1980s, and figurative compositions were also created over time. In 1995, the device was presented at an exhibition in Boston. The artist would like his machine, the composing algorithm, to be treated as a co-creator of the works, because the program is responsible for what is created in the final version. Here, the robot is not only a medium of art, as the artist understands it, but is a type of subject, a derivative of the aspect of human creation that, leaving the human, begins to take its own steps. Only to what extent is the creation a work of chance, and to what extent is this construction just a variation of human thinking, from which we would like to take away the power of agency and attribute it to the machine.

COMPOSING ROBOTS

The robot named Paul, a device created by Patrick Tresset is more anthropomorphic, it was presented in 2011 in London. Tresset created several robots that draw portraits, they have their own style, to some extent imitating Tresset's own drawing style (Kluszczyński, 2016). Robot shows become an interactive performance during which you can be portrayed. The work is generated by a device, the image of the posing person is read by the camera, the algorithm processes this image into a drawing, the drawing mechanism is started which fixes the composition. The final effect of the drawing is not known, you have to wait until the device finishes it, the portraits are not identical, each time they are processed slightly differently, which makes the composition unique. Frédéric Fol Leymarie helped Tresset in determining the sequence of drawing creation. The next machines are Paul IX drawing still lifes and a special robot Peter, who constantly erases, smudges his work, is captured in the constant transformation of the creative process, in what some believe is the essence of creation. Do his works provide him with a kind of immortality, as Tresset would like? draw in a similar way to him? There is not only an artifact here, this artifact composes and will continue to do so after the artist's death, i.e. new, in a sense, works by Patrick Tresset will continue to be created. The process of creation is difficult to define, to capture, just like consciousness itself and the mystery of life that can produce art. Mechanisms such as the robot Paul are not only an attempt to compose artifacts, but a search for individuality, the continuity of a certain unique pattern of creation.

Ai-Da is a humanoid robot, it draws and paints using cameras in its eyes, artificial intelligence algorithms and a robotic arm. She was created in 2019, her compositions were shown at the University of Oxford at the Unsecured Futures exhibition. She had an exhibition at the Design Museum in 2021, in 2022 at the Venice Biennale. She is shown together with works internationally, encouraging discussion on the status of the artist and creativity from the point of view of posthumanism.

Robotic art is also a desire for a new kind of contact. The very creation of art is the artist's view of the world. It is a kind of contact, a message, a subjective, non-discursive need to share a certain experience, an inner vision with another human being. The robot artist is a dream that an artificial subject will send us a message about a certain emotion, will convey a new kind of experience and aesthetic experience that will go beyond previous definitions. It is an eternal desire for transgression, development and learning something new, and through this also oneself. It is learning about oneself at the moment of transcendence, transformation, choosing one's own direction of development.

BILL VORN'S ROBOTS

Canadian artist Bill Vorn has been creating robots within the field of robotic art since the 1990s. His creations are often aimed primarily at evoking empathy, seeing a creation resembling a suffering, imperfect being that seems to struggle with the hardships of life.

Vorn's breakthrough work was *La Cour des Miracles* from 1997, in collaboration with Demeres (Vorn 2009). At that time, he began creating robotic constructions, according to several patterns, or one could say species, each of them having its own, different ability to interact, react to the environment and recipients. They were to reflect the "misery of machines", as the author calls it, their confrontation with the fact of life, and the inconveniences resulting from it, inspired by Victor Hugo's *Les Misérables*, which described the slum district of medieval Paris. *The Crawling Machine* tried to escape from the observers by crawling clumsily and with difficulty on the floor. There was also a machine that reacted in the opposite way, the *Harrasing Machine*, which had tentacles moved by spun air, trying to touch the person nearby. The *Convulsive Machine* suffered from irregular convulsions, which increased as the viewers came closer. The most dynamic was the *Heretic Machine*, which had to be locked in a cage, whenever the viewers approached it grabbed the metal bars and shook the cage, as if trying to escape. *Stéla 01* is a work consisting of 128 rotating mirrors, above which a robot, resembling a human in shape, is placed (billvorn.concordia.ca, 2002). Vorn drew inspiration from the tombstones of the Pere Lachaise Cemetery in Paris, wanting to show the indecision between reality and virtuality, life and death, movement and inertia, humans and machines. A humanoid robot statue stood on an aluminum and Plexiglas stele, covering its face with its hands. Video images of a human death were projected onto the surface of the stele, which was actually a mosaic of smaller rotating plates, acting sometimes as screens, sometimes as mirrors. As viewers approached through the stele, the robot statue removed its hands from its face, spread its arms, and transformed into a machine. The video screen began to move, and the images were deconstructed and transformed, as if artificial life were taking over an impossible life. The DSM-VI installation comes from 2012, inspired by the fourth volume of the DSM, the Diagnostic and Classification Manual of Mental Disorders of the American Psychiatric Association, and the fifth volume was published in 2013. The volume analyzes disorders such as neurosis, psychosis, personality disorders, paranoia, schizophrenia, depression, delirium, and other types of behavioral and mental dysfunctions (Vorn, 2018). Vorn tried to create robots in such a way that it would be possible to notice the aforementioned dysfunctions in their behavior, again the behavior is key here, more than the

appearance of the machine. They were immobilized, attached to the floor, sometimes giving the impression that they wanted to dodge, free themselves, unfortunately, to no avail. The central group consists of eight standing or lying psychotic machines, with two aluminum legs controlled pneumatically, loudspeakers, lights, sensors, and rotating reflectors. There were three *Autistic Machines* placed separately around, giving the impression of being detached from reality. These machines have a loudspeaker and two rotating cameras that somewhat resemble a human face and software that recognizes the faces of viewers. These robots tried to avoid other people, and also noticed faces where there were none, reacting by staring at a stationary point.

The robot is not a tool here that can replace a human, it deals with death, with the limitations of the body, with illness, it is imperfect and weak, can we accept such a robot better, does it seem less alien, even though its suffering is not real. It is also a way of drawing attention to how strongly someone's difficulties or disabilities are integrated, where the recipient may notice something that reminds them of themselves. A doll, a robot, another subject, is something that man has been trying to build since the beginning of civilization, recalling historical golems, feeling the incredible loneliness of a species, having noticed the gap between the world of humans and animals. Perhaps less cruelty to animals, searching for a being who genuinely feels will reduce the loneliness mentioned above, perhaps it is a kind of unconscious "pain" of an insensitive conscience.

Through art created by the algorithm, we try to notice the difference in feeling, to notice the specificity of the artificial creator, we wait for the moment when we will be able to talk about its unique distinctiveness, which will announce that there is a robotic artist, and therefore a creation acting in a uniquely human way. From there, it is only a step to another level of communication.

In art, we perceive more than we can articulate discursively, trying to make the mechanism work in this field of communication is an attempt to better understand unconscious processes, to gain more complete knowledge about man, by trying to recreate such a communication process by a designed creative subject. This is a search for a new point of reference in the field in which we move, but it is difficult for us to define it precisely. Through art, we can express the desire for knowledge. In the experience and aesthetic experience, a scientific experience, a cognitive process, can appear.

With technology, the area of art is enriched with what is new, and perhaps, contrary to appearances, even more human. It is a need for contact that exceeds the conditions of the body, an attempt to build an aesthetic experience on a global scale, the possibility of building a creator in such a way as to fully know, master the aspects of creation, know the essence.

BIOART

A pioneer in this type of activity is Eduardo Kac, who in his initiatives on the border of art and science interferes with living organisms. His flagship work in the field of bio-art is his living, fluorescent rabbit, which glows in the dark due to having jellyfish genes. Another work is the biobot from the Eighth Day project; it is a robot in which there is a colony of *amoebdycitostelium discodeum*, its activity is monitored and processed into the biobot's movements. Kac tries to show in this way the neural processes inside the brain.

The biobot, moving around the closed exhibition space, has an audiovisual system that responds to the commands of Internet users. Gallery guests could observe the biobot directly, and virtual guests could generate interactions with the robot system. This work once again breaks the pattern of distanced science and engaging art, which we can call the third culture, a term coined by Charles Percy Snow, defining the dialogue between the exact sciences and the humanities.

To work in the area of biological medium, a laboratory is needed, it requires very restrictive conditions ensuring the viability of tissues. One of the places where such activities are performed is the SymbioticA laboratory in Australia (Kluszczyński, 2015).

GUY BEN-ARY IN THE BIOLOGICAL MEDIUM

Guy Ben-Ary has been using neuroengineering knowledge in his artistic works for about 20 years. His works belong to the field of bio-art and robotic art. The artist grows neural networks, using them as an important element that reacts interactively to other components of the composition.

The work *In-potentia*, created in collaboration with Kirsten Hudson, Mark Lawson and Dr. Stuart Hodgett, is a type of sculpture, the component of which is a grown brain (Ben-Ary, 2013). It can be called a borderline, semi-living existence, it uses iPSC technology (induced pluripotent stem cell technology), which allows for the reprogramming of stem cells. This technology allowed for the reprogramming of tissue cells into embryonic cells, which could then be transformed into neurons, thus creating an efficient neural network of the brain. It was placed in a type of incubator, which allows for the proper functioning of the neural network and allows for the recording of neuronal activity, which is translated into sound. The container was displayed in semi-darkness, somewhat reminiscent of a reliquary, or an 18th-century invention, but there is a living organ inside, the sound gives the impression of buzzing, scratching, an active network of neurons. This is a reflection on the status of life, the heart was considered the most important organ supporting life. In ancient Egypt and

Greece, as Martyna Michalska writes, among the Hebrews and Christians, breathing, divine breath, was very important, today the brain has become the key organ, but should we look for the source of existence in it? The mere presence of the brain means the presence of something living, but it seems insufficient, we can confront this issue by looking at the work *In-potentia* from the perspective of art and science, in search of an answer. Silent Barrage is a work created by Guy Ben-Ary together with Phil Gamblen from the SymbiotcA laboratory and a team led by Dr. Steve Potter from the Neural Engineering Laboratory at the Georgia Institute of Technology in Atlanta (Ben-Ary, 2009). It was decided to create an installation investigating the mechanisms that govern thought processes and decision-making, work began in 2006. Using the in vitro method, ten thousand neurons were grown on the surfaces of 1 millimeter Petri dishes, which were connected to robotic arms, thanks to sixty electrodes. Individual dishes became the equivalent of brains receiving and sending stimuli. The installation posts had an outer paper layer on which you could see the recording of neuronal activity, the amount of stimuli sent to the neurons depended on the presence of participants watching the installation, they were tracked by a system of cameras and mapping technology. One could find oneself in an environment giving the impression of a certain organism, Silent Barrage has the characteristics of a living organism, sensitive to bio-technological feedback. participants could enter into contact with a neural network, which responded through the activity of the robotic part of the installation. This work was the result of seven years of research, able to observe the processes of memory, learning, which occur thanks to the neural network. In 2012, Guy Ben-Ary decided to create a kind of his external brain grown from a culture of skin fibroblasts reprogrammed into stem cells, which were finally transformed into neurons (Ben-Ary, 2016). The work of cellF becomes a kind of musician that cooperates with humans. Amplifiers were connected to Petri dishes with a growing neural network on them, on which there are multi-electrode arrays, which received electrical signals generated by neurons, while transmitting them external stimuli. Signals from the neurons were transferred to amplifiers and directed to an interface, an analog sound synthesizer, in this way

CellF is heard, able to play music along with other musicians. The work combines a set of analog synthesizers and a bilo laboratory containing an incubator with tissue cultures where neuronal cells are located and a laminar chamber ensuring sterility of the cells. CellF, which creates music in real time, plays different music every time.

Bio Kino – Living Screen is a living screen grown from skin cells, or other types of tissues about half a centimeter in size, on which projections are displayed to be viewed through a microscope (Ben-Ary, 2014).

Within the area of robotic art and art combining living tissue cells with mechanism, experience and aesthetic experience gain a special form. These are

works combining scientific research and artistic creation, where the search for a means of expression becomes a research tool.

MEART

The desire to create a creative subject in art, a robot artist, is the desire to create or discover a being that will be able to communicate, to transmit the process of experiencing the world, from a perspective other than human. This is where the difficulty arises, intuitively we expect a creature that will react, behave similarly to a human, will have emotions, will experience; or a mechanism that will bring danger because it does not have the ability to empathize, and something completely different can happen.

The combination of mechanism and biological tissue is the work MEART – The Semi Living Artist (Ben-Ary, 2015). The first stage of MEART development was the installation *Fish & Chips* (2001). The name was changed when neurons grown on silicon integrated circuits (Chips) taken from the brain of a goldfish (Fish) were replaced with neurons taken from the gray matter of the brain of rat embryos, grown in a Petri dish using a set of microelectrodes (MEA). I would like to know how this idea affected the fish and the rat, what happened to these animals. MEART is an acronym for Multi-Electrode Array Art. An important element of this work is the culture of cells connected to the environment by an electronic circuit, which is a kind of brain of the resulting construction, treated as an artist and an art artifact at the same time. MEART was shown in 2002 at the Biennial of Electronic Art in Perth. It is one of the first biocybernetic, neurorobotic works.

It has three main elements:

- 1) wetware – neurons and glial cells taken from the rat brain and cultured on MEA; (cultured on a Petri dish using a set of microelectrodes)
- 2) hardware – robotic drawing arms;
- 3) software – an interface enabling communication between wetware and hardware (Kluszczyński, 2014, p. 358).

MEART has software, equipment that processes information, and hardware (robot arms) and wetware – a biological element that are connected to the Internet. The first two elements were geographically separated, wetware was in Potter's laboratory in Atlanta, hardware in an art gallery in Perth. The Internet was used for communication.

The gallery contained robot arms, a computer system and a camera that recorded the faces of individual people and the drawings that MEART produced. The human face was recorded and processed into a 64-pixel image, because that

was how many electrodes connected to wetware, they monitored 60 channels of activity of cultured neurons, constituting the MEART brain. The signal reached wetware as an electrical stimulus, triggering processes that were recorded and sent back to the robot's hardware, in the form of transformed impulses so that they showed the activity of neurons and triggered corresponding movements of the drawing arms. The processed image of the drawing is returned to the MEART brain. The creative system here is a cybernetic system that generates and receives impulses.

MEART records the image with a camera, replacing the eyes, processes what it sees using neurons, which perform the work of the brain. It takes action using mechanical arms, which constitute its body. The Internet here resembles a nervous system that allows for expansion.

The work is an experiment in which nerve cells are an element cooperating with an electronic device. MEART is bio-electronic. From the scientific side, the device uses adaptive and network mechanisms, and you can observe their course, from the artistic side, it is an attempt to create a creative object that has a certain autonomy in producing artifacts treated as the artist's works. Meart can be treated as a work of art, an object producing works of art, and a creation analyzing the environment, you can follow its perception of the environment and its processing, just like in the artist's observation.

Kluszczyński calls the MEART elements collectively "artware", which consist of software, hardware and wetware. A form is created that its authors defined as semi-living, because it is capable of learning, self-transformation. MEART supposedly goes beyond the previous definitions of a living organism. We observe perception, stimulation and action, as a result, a drawing can be a form of expression of a unique entity, a new aesthetic quality can be read in its products, but also information about a different type of perception. MEART drawings are called meta-artware (Kluszczyński). The prefix meta means that we are dealing with a work of art producing a work of art, or depending on the definition of a work of art, an artifact producing an artifact. It is also an object producing a situation of a work of art that forces us to revise the definition of art and its components, the artist, the artifact, the aesthetic situation, aesthetic concepts. One can reflect on the evolution of technology, its better connection with biology and the direction of contemporary transformations, their possible results. Thanks to MEART we learn about new branches of creativity, biocybernetic, biorobotic and cyborg art, which were created thanks to the transformations of the concept of art developed by conceptual, generative (i.e. performed by a program) and performative (performance) art.

In this way, the concept of art combined with science is realized. The concept of creativity, artist, work of art, their status and rank can gain new definitions. A creative artifact can be both an experiment and a tool of science. Fulfilling the need for aesthetic and scientific experience in accordance with the

existence of a third culture combining these activities, instead of separating them from each other, can in this way search for new shapes at the intersection of the field of art and science, which has always generated valuable emergences.

In my opinion, we are not yet dealing with a postbiological world, but with an environment where new forms of biology cooperating with technology and technology better shaped to cooperate with the biological component are developing. Technology has always existed in conjunction with biology, as a creation that is a tool of man, a biological being. It seems that biotechnology is the result of a process that began to take shape at the very beginning of the emergence of technological devices. Does the position of the artist, the definition of creativity, change in the presence of new biotechnological creations, synthetic biology?

Issues of aesthetics, ontology, ethics, exact sciences, knowledge of technology, engineering, are elements needed to analyze objects such as MEART.

If the human DNA code is subject to modifications, we may face a change in the perception, thinking of the human being much more different than ever before. Currently, aesthetic experience is a reflection of art that not only crosses borders, but is the result of the digital revolution, globalization. The recipient of art aesthetically experiences their existence in a space increasingly changed by technology. Due to the presence on the web, where the user is interactive, more works of art are created that are focused on interaction, the experience of art is not only immersive but is an observation of the attempt by artists and scientists to combine biology and technology, an attempt to bridge the gap between the world of digital media and living tissue, which is also a medium of art. Will this boundary not become so sharp over time, or will human actions take a direction that we are currently unable to predict?

Art as a dialogue between people, a social agreement on what aspect of creativity we want to engage with, is a mirror of the current level of the actually functioning hierarchy of ethical values, a form that is not indifferent to them. The language of art allows for the transmission of anxieties and hopes in a language richer than spoken language, conducting communication that goes beyond conscious reception is an existence that man cannot lose. Art may cease to be called art, but this way of communication will continue, under a different name.

I also think that the anxiety associated with losing the development of a series of understandings under the name of art is not so important. It seems more important to preserve what has been said thanks to art. To remember the way of more subtle perception of reality, to reap the benefits of participating in building worlds of culture, stories that every civilization creates even involuntarily. Art can be understood as a certain way of human existence, and therefore as something that manifests itself in the specificity of his existence, regardless of what he calls it, regardless of the level of his consciousness.

What transformation of experience has taken place? We try to share our experience, currently sharing materials, also digitized works of artists is almost equivalent to the existence of the recipient, who becomes a digital creator, recorder and sender of content, which can often shallow, disrupt the reception. Exploring different worlds, the user tries to search for a sense of being in a community, which paradoxically begins to slip away. On the other hand, more subtle types of contact are created, based on an understanding of the mind, a direction that is particularly important. With conceptual art, not the physical form of the artifact became essential, but what is created during the interpretation of the work, its message, where the physical form is secondary, the depth of meaning becomes all the more important, because it can replace the difficulties with location – where we are, or where our field of influence is.

We live inside an enlarged space, in which we search for specificity, which Manovich calls poetics. Perhaps this is a space that does not lead to getting lost, but rather to connecting the mind that precedes the body, would like to be a generator of common spaces of contact and starts to succeed, which will not mean safe spaces either. As one can refer to McLuhan, where each medium becomes an extension of certain human abilities, we are still building a tool to help realize human potential, this time it is the potential of community, which is one of the most important experiences, which is why it is still explored by art (Zawojski, 2000; McLuhan, 2004).

The robot creates creations, compositions that are increasingly diverse, it is a constant pursuit of understanding the essence of creation, and therefore a being that has mastered the art of creation, it is also an attempt to unravel unfathomable biological mechanisms. This direction is also taken up only in a different way by bioart, which, through the manipulation of the DNA code, the implementation of biorobotic creations, tries to fully understand the essence of the tool of technology and strengthen and adjust the technological prosthesis, improve the delicate and requiring constant nourishment and care biological body. The greatest transformation is existence in the digital community, the global image of the world that we carry and which resonates in the context of works that explore the curiosity of the scientist, which in the field of art will be an experience of the need to transform the world that will never leave man. Will the tool-ness of the robot cease to worry over time, it is as if it was possible to combat the alienation from technology despite the fact that it is a human creation, as if man stopped fearing his own element of aggression. And interference in DNA can become much more dangerous, it is the kind of tool that can most transform the fundamental interface of art, the human mind. Art alerts and taming by art, shows in the field of experience the possible consequences of the latest phenomena and shapes sensitivity so that man does not get lost at the interface of created worlds, but finds himself as a kind of constantly transforming hybrid. This is not one direction, this experience certainly exceeds

the field of art and becomes a reflection of art commenting on times of breakthroughs, it is also not a type of question to which an answer can be given, then the path of our development would be very unambiguous.

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POCZĄTKI PRZEMIAN DOŚWIADCZENIA ESTETYCZNEGO SZTUKI NA PRZEŁOMIE XX I XXI WIEKU

Streszczenie

Jakie jest doświadczenie rewolucji cyfrowej? Doświadczamy bycia w rozszerzonej przestrzeni kontaktu, AR i VR. W przestrzeni sztuki każde nowe narzędzie, aspekt nowego, rozszerzonego sposobu funkcjonowania, staje się medium sztuki, środkiem wyrazu. Rozwój genetyki, możliwości ingerencji w DNA organizmu wpłynął na prace z dziedziny bio art. Człowiek wyłączył twory technologii poza obręb natury, wyodrębnia część swojej specyfiki jako tak inną, że potrzebuje sam akceptacji swojej działalności. Czy sztukę może wytwarzać narzędzie pozbawione świadomości, czy też jego twórca staje się współautorem, tak jak w pracach AARON Arnolda Cohena, czy *Paul the robot* Patricka Tresseta? Doświadczenie sztuki jest pewnym współdzielonym przejawem bycia, intersubiektywnym, specyficznym dla człowieka. Część tego doświadczenia jest związana ze specyficznym czasem powstania i odbioru danego tworu. Czy ulega ono całkowitej transformacji, czy też pewien trzon specyfiki tego sposobu kontaktu pozostaje niezmienny? Próba uchwycenia obecnej zmiany w doświadczeniu, pewnej atmosfery, którą współdzielią najnowsze przemiany w sztuce, używającej prekursorskich narzędzi nauki, jest nie tylko możliwością odpowiedzi na pytanie o obecną tożsamość współczesnego odbiorcy, uczestnika sieci. Jest to poszukiwanie wspólnego kierunku przyszłych dzieł sztuki, wynalazków technologicznych, wyobrażenia sobie i zbudowania otoczenia, które odpowiada na aktualną potrzebę sztuki, na to jaki sposób bycia chcemy sobie zaprojektować.

Słowa kluczowe:

doświadczenie estetyczne, sztuka robotyczna, sztuka biorobotyczna, ARTEX

Ewa Wójtowicz



<https://orcid.org/0000-0002-8659-940X>

Magdalena Abakanowicz University of the Arts Poznan

ewa.wojtowicz@uap.edu.pl

DEMYSTIFICATION OF THE CLOUD AS INVISIBLE TECHNOLOGY: AESTHETIC, SPATIAL AND AFFECTIVE ASPECTS IN ART AND CRITICAL INFRASTRUCTURE STUDIES

Abstract

The article examines the topic of the technological Cloud as one of the features of the Fourth Industrial Revolution. It focuses on the Cloud's ambivalences, discussing its various aesthetic, spatial and affective aspects. The methods for approaching the phenomenon of the Cloud are developed both in theory, in the disciplines of critical infrastructure (CI) studies and art studies as well as in visual arts practice. The main theoretical stances, from which the article draws on, are developed by Benjamin H. Bratton, James Bridle and Tung-Hui Hu. The article also briefly outlines the history of CI studies with its main areas of research (e.g data centre studies) and examples from the field of art. The issues addressed in the article include: the invisibility and inaccessibility of the Cloud (as a networked hyperobject and as a technological infrastructure), the architecture of data centres and the ambiguous relation that Cloud establishes with its users, as well as ecological concerns. The Cloud as invisible technology is discussed from many perspectives, from the one that supports its development straightforwardly, to those which attempt to demystify its seemingly immaterial image and indicate critically its relations with extractivism as well as suggest proposals of resistance.

Keywords:

The Cloud, critical infrastructure studies, invisible technology



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INTRODUCTION – THE FOURTH INDUSTRIAL REVOLUTION VS. CRITICAL INFRASTRUCTURE STUDIES

If the three essential features of the Fourth Industrial Revolution are identified as: velocity, breadth and depth, along with the cross-cutting impact on all systems (Schwab, 2016, pp. 7–9), then in the realm of Critical Infrastructure Studies (CI Studies) fairly similar categories are involved, in order to discuss technological aspects of contemporary culture¹. However, the worldview perspectives are considerably different. This difference lies, firstly, in a critical approach in the CI research circles stemming from distrust of official global-economic rhetoric promising a better world based on technological progress. Secondly, the CI studies are often carried out with the significant help of art practice and art-based-research methodologies in which asking critical questions is inherently inscribed, and that significantly helps challenging theses too often taken for granted.

While Klaus Schwab defines the impact of the Fourth Industrial Revolution as “the transformation of entire systems, across (and within) countries, companies, industries and society as a whole” (2016, p. 9), various thinkers (academics, researchers, artists), such as Benjamin H. Bratton (2015), James Bridle (2018), Daphne Dragona (2019), Kyriaki Goni (2016), Mél Hogan (2023), Tung-Hui Hu (2015), Vladan Joler (2020), Metahaven (Vinca Kruk and Daniel van der Velden) (2012), Jenny Odell (2013, 2015), Evan Roth (2015), Nadim Samman (2023), and Liam Young (2019), seem to notice this process too. Their approach is less general and more situated though, to use the term once introduced by Donna Haraway in the context of knowledge (1988). The expressions of the critical debate taking place within this circle are transdisciplinary statements in various formats (theoretical reflections, curatorial concepts or artistic projects), and often they raise issues unnoticed in the official rhetorics of the leader of World Economic Forum. Expressing the anxiety shared by many users of new technologies, the CI studies scholars draw attention to the tangles of affective contradictions, states of perplexity and powerlessness, disorientation, alienation and exclusion, and even a feeling of entrapment, as well as a growing sense of confusion. Another difference from Schwab’s conception is the notion, shared among critical infrastructure researchers (and the explorers from the field of art), that no industry is neutral. For it is associated with colonial extractivism and the insatiable capitalist exploitation of “ghost acreages” (Pomeranz, 2000), transforming everything into resources, no matter the scale; both people (Hu, 2015; Joler, 2020) and planet (Bratton, 2015).

¹ Critical Infrastructure Studies have a double meaning, referring primarily to studying infrastructure critically with the help of humanities, but also paying attention to critical infrastructures as such.

The Fourth Industrial Revolution also raises environmental anxieties, as many advanced technologies still depend on fossil fuel energy. New technologies, after all, also require infrastructure, at least in the form of cabling, which course often follows a trail that reveals colonial relations of power and (slow) violence. Technological acceleration not only affects the depletion of natural resources, but also results in so-called techno-progery, causing rapidly ageing equipment to end up in landfills and poisoning the environment already degraded by extraction of resources. All of this raises concerns about the effects of this technological (r)evolution and its invisible mechanisms, especially as, by succumbing to the encouragements typical of revolutionary rhetoric, by looking forward to the future, we lose sight of the present. Therefore, demystification of the technological infrastructures in the field of theoretical inquiry and artistic exploration is an example of recognising some problems of this uncertain and in a way overlooked present, as well as the impulse to take up the enquiry on its aesthetic, spatial and affective aspects. However, it is not an easy task, as the object of studies is mainly unseen or unavailable, but it may be undertaken with the help of art, as a discipline with a long tradition of dealing with the invisible, elusive and imagined.

With this in mind, the aim of this article is to discuss chosen examples from the circle of CI studies and related artistic attitudes, whose common denominator is a critical reflection on one of the most important elements of the infrastructure supporting, among other things, the Fourth Industrial Revolution – the Cloud². It is understood as a technological hyperobject (Morton, 2013) or “a vast, discontinuous apparatus” (Bratton, 2015, p. 116), often represented in the form of a graphic symbol, most resembling the type of a cloud called cumulus.

METAPHORS AND PHYSICALITY OF THE CLOUD

The Cloud is an example of technology providing management of both data and human workers (Schwab, 2016, pp. 49-50), thus supporting the Fourth Industrial Revolution straightforwardly. However, it also produces a particular aesthetic that may bring ambivalent feelings and experiences, resulting from numerous contradictions and uncertainties. Even speaking of the Cloud in the singular is a misrepresentation, resulting from marketing rhetoric presenting it as an extraterritorial monolith. The most crucial feature of the Cloud is its invisibility,

² In this text I mostly follow Bratton’s understanding of the Cloud, and in only selected cases I do not use capital C, when trying to indicate a slightly different meaning (e.g. the early days of cloud computing, before the Cloud in its contemporary version was developed) or within quotations.

taking place on at least two levels: as a hyperobject that escapes our perception through its scale and also because the infrastructure that supports it is not accessible to those unauthorised, including actually all of us – as mere users. This is more so because the popular narrative about the Cloud is based on maintaining the impression of its immateriality, since then the physical infrastructure and harmful environmental effects may go unnoticed. The Cloud is thus removed from view, and even when in plain sight, it still remains hermetically sealed in the likeness of a black box, a metaphor often used to refer to the implicitness in terms of infrastructures and the processes which underpin them (Galloway, 2010; Pasquale, 2015). When the course of action that leads to these outputs is unknown to users of such black boxes, they are in a way excluded and may feel disempowered, which raises if not fear, then at least anxiety of a technological kind. It should be added that the black box metaphor is still relevant today, only that it has changed scale to almost planetary, appropriately to the architecture of cloud platforms, and at the same time it is still scaled down to individual, in the context of users' alienation in their "crypts" (Samman, 2023). The Cloud not only belongs to "affective infrastructures" that Daphne Dragona (2019) writes about, recalling Lauren Berlant (2016). It is also a part of infrastructure in its most essential meaning, as something being "infra" (translated from Latin as "below"), then deeply hidden, even if it is "incorporating air-traffic and orbiting satellites" (Samman 2023, p. 25), as agents from the rather outer, than inner space of the Earth.

Hence, how to examine the Cloud from the perspective of art studies and artistic practice with the help of theory from the realm of CI studies? Seems like it would be difficult to find a more invisible object of research, even though, being users of both the Cloud as such as well as the platforms running on it, we have relatively free access to its interior. Nevertheless, being inside this virtual space, does not mean having a closer insight into it, but rather the opposite: it results in isolation, confusion and asymmetric relations with systemic procedures (Joler, 2020; Samman, 2023). It is equally difficult to see the Cloud from the outside, as it is hidden by the architecture of data centres, impenetrable and designed not for humans, often located in places that are difficult to access, classified as human exclusion zones (Young, 2019). Moreover, the outer shell of the Cloud, i.e. its material manifestation as a server farm, is actually as inaccessible, just as a black box. However, it is possible to observe attempts in this regard made in the field of CI studies, where both scholars and artists pay attention to the dimension of aesthetics, expressing their observations in verbal and/or visual forms.

Outlining the prehistory of the Cloud, Tung-Hui Hu (2015) points to a number of (sometimes deliberately perpetuated) misunderstandings that have accompanied its comprehension and promotion since the early days. Firstly, the concept of cloud computing itself is much older than the digital technologies and

services bearing the word “cloud” in their name, offered by commercial platforms that came into use a couple of years ago. Taking the origins of the Cloud as its graphical symbol used to describe irregular networks made up of infrastructure in the form of disks, servers and cabling, Tung-Hui Hu considers it to be the first example of full virtualisation, whereby a physically existing network is transformed into an icon in the shape of a stylised cloud (2015, p. XI). Such inaccuracies, ambiguities, and even cultural fantasies began to grow around the concept of the Cloud from the very beginning. The fictitious nature of these myths has never been actually corrected by the Cloud providers, being supposedly not in their interest, as it would have had a negative impact not only on the image of the product, but also on the myth of the “pure” and seamless technology. It would have also turned the spotlight to unpopular environmental and ethical issues. One of such problems would be the labour to sustain the vitality of the Cloud, because, as Hu mentions:

By producing a seemingly instant, unmediated relationship between user and website, our imagination of a virtual ‘cloud’ displaces the infrastructure of labor within digital networks (2015, p. XII).

This labour is about everything that is removed from the sight of users at every level of the Cloud's existence, as much the devices in the server rooms as the moderation of sometimes drastic content on social media platforms performed by low-paid Third World workers for the convenience of consumers in the so-called First World.

That is why researchers of this technological phenomenon begin their critical discussion with the necessary demystification of the notion and seek to define the Cloud starting from questioning its stereotypical characteristics. For example, James Bridle writes:

The cloud is not some magical faraway place (...). It is a physical infrastructure consisting of phone lines, fibre optics, satellites, cables on the ocean floor and vast warehouses full of computers that consume huge amounts of water and energy and reside within national and legal jurisdictions (2018, p. 7).

Similar definitions of the Cloud are provided respectively by Tung-Hui Hu (2015) and Benjamin Bratton (2015). In their views, the Cloud appears as a paradoxical hyperobject, made up of numerous nodes connected in a network with a potentially infinite flow of data, yet demanding huge amounts of energy and occupying a tangible physical space.

These constataions are the first and essential steps towards demystifying the Cloud. However, the widespread misrepresentation is still different; we tend to believe that the Cloud is neutral, extraterritorial and immaterial, and that belief increases the range of myths about it. Instead, it is geographically located and

subject to specific legal rules as well as requires certain territorial and substantial parameters to be met (Bratton, 2015; Bridle, 2018). Also Hu points out that

The data center remains among the least studied areas of digital culture, with cloud computing producing a layer of abstraction that masks the physical infrastructure of data storage. Paradoxically, then, data centres exist at the border between the dematerialised space of data and the resolutely physical buildings they occupy (2015, p. 81).

Bratton makes the same point, putting it in the words of the paradox that a feature of the Cloud is “*the physicalization of abstraction and the abstraction of physicalization*” (2015, p. 29)³. This is also important because, “[o]ver the last twenty years, the Internet has been variously described (...) Each term brings with it an implicit politics of space (...)” (Hu 2015, p. XXIV) and that, in turn, brings along certain myths and stereotypes.

Similarly, the architecture of the objects hosting the Cloud is not impressive, and is unlikely to serve aesthetic contemplation, with the commonness of the buildings, highlighted by Hu when he describes the (an)aesthetics of data centres with words and photographs, referring to the photographic works of Bernd and Hilla Bechers as well as Ed Ruscha (2015, pp. 73–77). The problem is that these objects are also usually guarded, monitored, prohibited from being photographed and treated as critical infrastructure facilities, even if they belong to commercial entities. They are also secured on the IT side. These data centres create a Cloud that transcends national borders, but one of the effects of the emergence of its virtual territory is the implosion of physical space, triggered in particular by large-scale popular platforms related to data handling, commerce or the maintenance of social relationships. James Bridle puts it straightforwardly that the Cloud has already absorbed

many of the previously weighty edifices of the public sphere: the places where we shop, bank, socialise, borrow books and vote. Thus obscured, they are rendered less visible and less amenable to critique, investigation, preservation and regulation (2018, p. 7).

Tung-Hui Hu states it even more succinctly, that “the cloud has turned geography into the virtual flows of market capital” and recognises that it “represents a new reconfiguration of the relationship between place and placelessness” (2015, p. 4). This ambiguous nature of the Cloud results in confusion while reading reflections on it, due to writing alternately about either

³ The italics after the author of the quoted text.

the material plane of the Cloud or its virtual character. It may be an inspiring circumstance, however, because “[b]y examining the physical geography of digital networks, we can see the spaces” (Hu, 2015, p. 2), where the course of the infrastructure of old and new media is almost identical, therefore “even as digital networks seem to annihilate or deterritorialise physical space, space seems to continually reappear” (Hu, 2015, pp. 3–4). The architecture of some of the facilities that house the Cloud is a case in point, as “a number of the data centers enclose data inside repurposed Cold War military bunkers” (Hu, 2015, p. XXVIII). Then comes “a reanimation of what is known as sovereign power within the cloud, power as dependent on or coterminous with a specific territory” (Hu, 2015, p. 92). This leads to a consideration of the relationship of power to a given territory and the presence of that power in the operating procedures inherent in the functioning of the Cloud; for example, the socio-technical protocols embedded in it.

Both Hu and Bratton write about the space produced by the Cloud using the notion of sovereignty, in a context which is rather absent in the rhetorics of Klaus Schwab. Hu points to the two models for thinking about sovereign power in critical media studies. The first and earlier is based on Michel Foucault’s thought on the transition from societies of sovereignty to societies of discipline (1975). The second, developed in the decade preceding the publication of *A Prehistory of the Cloud*, is the model of the society of control derived from the ideas of Gilles Deleuze (1992). Hu, however, believes that this concept is already too obvious today and proposes to go beyond it, back towards Foucault, to arrive finally at the question of sovereign power, only that in a mutated form corresponding to networked dispersal. He describes “this new hybrid form the ‘sovereignty of data’” (Hu, 2015, p. XVI). Bratton writes similarly about swapping positions between Clouds and national states, which is a result of emerging translocal, giant platforms as new subjects of sovereignty (Wolak, 2021, p. 175). This process contributes to creating so-called Cloud Polis, whose characteristics are, among others: “hybrid geographies, incomplete governmental apparatuses, awkward jurisdictions, new regimes of interfaces, archaic imagined communities” (Bratton, 2015, pp. 369–370). Its political system is Cloudfeudalism and its inhabitants are Users (all written with capital letters, according to Bratton), detached from specific locations, constantly migrating and held in instability, which can also be understood as a description of their precarious status. This can be compared to the concept of a human cloud introduced within the idea of the Fourth Industrial Revolution, with the mentioned negative aspect of establishing “unregulated virtual sweatshops” and potential exploitation of labourers (Schwab, 2016, p. 50).

STAGES OF RESEARCH ON SOVEREIGNTY OF THE CLOUD

At the beginning of the first decade of the 21st century, with the increasing crisis of cybercultural utopias, and even before the scandal caused by Edward Snowden's revelations, some comments and insights directing attention to the importance of telecommunication infrastructures began to appear in print (Chun, 2008). These have spanned from academic publications to popular journalism and – last but not least – art projects; the latter two categories are what infrastructure scholar Mél Hogan calls “interventions” (2023, p. 385). After the PRISM affair, a debate commenced of the advent of the post-digital age (in arts and humanities it was mostly the circle of artists and scholars taking part in transmediale 2013 and subsequent editions of this Berlin-based festival) and it was even announced that “the Internet no longer exists” (Aranda et al., 2015). All this contributed to the formation of an ‘infrastructural turn’ within Internet culture research and the development of interdisciplinary infrastructure studies. This has resulted in a proliferation of scientific texts on the so-called information architecture, which includes server rooms, data processing centres and other technical infrastructure facilities, such as fiber optics cabling, both by individual researchers (Blum, 2012; Starosielski, 2012 and 2015; Burrington, 2016), as well as in The MIT Press *Infrastructures series*, started in 2013.

In the history of research on the Cloud as a part of CI studies, two phases can be observed. The first is the introductory phase of Cloud research (2012–2018), with 2015 and 2016 being the most prolific years for reflection, which I propose to call the phase of ‘geographical discoveries’ regarding the territory of the Cloud and its topology as well as the resulting demystification processes. One of the earliest and significant texts is the overtly critical three-part article by the Metahaven artistic duo, which refers explicitly to “Cloud Hostages” (2012).

The second phase, which begins with the third decade of the 21st century, includes the already existing field of critical Cloud studies, which has emerged as a separate scope of research. It shares some common interests with data centre studies, developed as a research sub-domain of the aforementioned CI studies. They are primarily conducted in conjunction with environmental impact concerns and in relation to data issues, in the context of control and surveillance, which will probably result in a further diversification of the research focus in the future. A recent example is the Canadian research project Critical Studies of the Cloud led by Mél Hogan within the Environmental Media Lab, who acknowledges that “art could be woven into scientific argumentation, just as scientific arguments seem to be woven into art” (2023, p. 386). Appreciating this methodological decision as coinciding with my long-standing attempts to value art as a fully-fledged scientific statement, I am going to refer here to both selected artistic attitudes and theoretical views, mostly showing intentions to demystify the Cloud by visualising it applying various methods.

THEORY AND ART-BASED CRITICAL RESEARCH OF THE CLOUD

Following the issues that emerge from texts and art projects dedicated to the Cloud, four main problem areas can be identified. The first relates to the (in)visibility and inaccessibility of the Cloud on both virtual and material level, which hinders its investigation. The second relates to its foundational myths and the attempts at demystification made by the research and art communities despite the aforementioned obstacles. The third area of issues is its situatedness and the geographies it produces (including the theme of sovereign power that the Cloud represents and implements). A final, very important issue is the ecological impact of the Cloud. An appendix to these issues would be a description of attempts to address them at least in part on the way to “going off-the-cloud” (Dragona and Charitos, 2016).

Mél Hogan, discussing artistic practices relating to data centres, distinguishes four essential categories of attitudes: disclosure, assemblage, remix, and orientation towards possible futurities (2023, pp. 384–404). In this first category, Hogan recalls the example of *Landscape Series* (2015) by Evan Roth, a project dedicated to the exploration of infrastructural landscapes. In order to “see the Internet somewhere” (Small, 2018), the artist visited points where intercontinental fibre-optic cables emerge from the sea and cross onto land (or vice versa). This is the case, for example, at Porthcurno in Cornwall, where the FLAG fibre optic cable leaves the British coast and plunges into the Atlantic Ocean. The site is distinguished by a pyramid-shaped monument, commemorating the so-called Wireless Point, where the first telegraph cable enabling a connection to America went beyond the Old Continent. It is thus an example of ‘overwriting’ (a metaphor from IT) or, as Tung-Hui Hu would name it, ‘grafting’ (a metaphor from horticulture) a newer communication medium onto an older one (2015, p. 7). Hu describes this using the example of “the immediate predecessor for the cloud’s global fiber-optic backbone: submarine cables. As Nicole Starosielski has shown, these cables [are] designed to bind together British territories in the Pacific with England (...) avoiding landings on rival empires” (2015, p. 90; Starosielski, 2015, pp. 107–108). Roth is also aware of this process, reaching for the maps of colonial empires and the fact that the fibre-optic cable located on the site of the former telegraph are “not just carrying data, but also existing power structures” (Small, 2018). Therefore, Evan Roth’s project inscribes the theme of the Cloud into a broader, both theoretical and practical reflection on infrastructure and the various layers of meaning that cast a shadow over its apparent neutrality. In this way, the artist addresses the myths about the immaterial and neutral Cloud, sustained through optimistic marketing rhetoric, but rather masking sovereign ambitions and colonial exploitation.

The Cloud, however, consists not only of popular platforms providing various remote data access and storage services. It also comprises numerous

(infra)structures that do not have a user-friendly interface, but are a part of the planetary hyperobjects that sustain communication, prediction or security systems, such as sensory networks. Hence attempts to map the Cloud, such as the *New Cloud Atlas* project, whose title refers to a meteorological *Cloud Atlas*, but which is an open, interactive map of the technological Cloud and at the same time an example of alternative, critical cartography in practice and an attempt to make it visible (Frid-Jimenez et al., 2014).

After all, if the Cloud is so invisible, how can we see it and then make at least its key features more apparent? One of James Bridle's proposed ways of seeing the Cloud would be

to look where its shadow falls: to investigate the sites of data centres and undersea cables and see what they tell us about the real disposition of power at work today" (2018, p. 8).

For, as Tung-Hui Hu argues, recalling his personal experience of dangerous peering into a fibre-optic cable, the Cloud cannot be seen directly, as this would be akin to trying to find out what a film is about by looking into the beam of light from a cinema projector (2015, p. XX). Therefore, "[a]nalyzing the cloud requires standing at a medium distance from it, mindful of but wholly immersed in either its virtuality or its materiality" (2015, p. XX). However, this is a difficult and complex task, not only because of issues already mentioned. Also for the reason that the unnoticeable, aesthetically unattractive, hidden objects are part of so-called policy of concealing that has much in common with the power relations inscribed in that infrastructure depending on its scale (Burrington, 2016; Bratton, 2015, p. 115). Although these facilities are not themselves invisible, their presence is hidden "whether in the landscape, or deploying boring aesthetics or no signage" (Hogan, 2023, p. 389).

One *way of seeing* (to paraphrase John Berger, 1972) that would fit into this middle distance postulated by Hu, would be to consciously *see* what is obvious but not very exposed in relation to the internal geography of the Cloud. All too often, it is presented as a form that is as abstract as it is monolithic and, like atmospheric clouds, capable of transcending national boundaries. This is not entirely true because, as Hu notes, the Cloud being "the dominant metaphor for digital space", is actually "a metaphor for private ownership" (2015, p. 147). He is echoed by James Bridle in pointing out that what evaporates from our field of vision. It is "agency and ownership: most of your [data] are in the cloud, on somebody else's infrastructure" (2018, p. 8).

A good example of artistic methodology applied to illustrate this point is *Farm (Pryor Creek, Oklahoma)* (2015) by John Gerrard. After being refused entry to a server farm owned by Google, the artist hired a helicopter and took aerial photographs of the area, then transferred them to 3D modelling using

software used for video game set design. The result is hyper-realistic and the simulated camera ride along the hangars that shelter Google's data centre is confusingly reminiscent of a high-definition film image. These seemingly real moving images were created artificially, creating a tension between the strategy of a documentary and the applied tactics of the simulation. Therefore, the demystification of the Cloud in this project is not straightforwardly critical, exposing rather its ambivalences and myths inscribed in this technological phenomenon, resulting from the lack of access to its facilities. As a result, recognition is replaced by imagination.



Fig. 1. John Gerrard, *Farm (Pryor Creek, Oklahoma)*, 2015, research photo: Blake Gowriluk. Photo courtesy of the artist and PACE Gallery.

Also, Jenny Odell showed a similar attitude in her work *Satellite Landscapes* (2013-2014), when she produced images of data centres and similar cloud infrastructure facilities, synthesising them from material available through Google maps and satellite views, among others. Her method reminds of tiled rendering, applied while composing the image of the Earth for the purpose of its visualization belonging to the so-called Blue Marble imagery. It is the same kind of a method, that Nicholas Mirzoeff identified

a standard means of constructing digital imagery. It is a good metaphor for how the world is visualized today. We assemble a world from pieces, assuming that what we see is both coherent and equivalent to reality. Until we discover it is not (2016, p. 23).

A likewise aesthetic is discernible in a work *Polymorphism (Data Centre Simulation)* (2015) by Kynan Tan, who explains that

[t]hey are highly restricted, massive buildings with no windows – a realisation of a ‘black box’ – an opaque system that has inputs and outputs but no way of knowing the internal workings. This work attempts to take something imperceptible and make it physical. (...) Data centres are ghostly entities that cannot be directly seen or felt, yet are constantly producing and reproducing the structures of society through algorithmic processes which in turn directly take effect on everyday life (Tan, 2015).

These images have been created from various pictures of data centres available online, which are de facto not confirmed as real photos, although they may be typical. So if the material for the project is actually the iconography of fiction, it paradoxically in this way confirms and reinforces the imagined picture as a true one.



Fig. 2. Kynan Tan, *Polymorphism (Data Centre Simulation)*, 2015, projected computer-generated simulation, 2ch sound. Photo courtesy of the artist.

The above mentioned methods of artistic analysis of what is not meant to be seen directly are based on a hyper-distance and staying outside; but what if going inside doesn't help much anyway?

One of earlier examples is Timo Arnall's *Internet Machine* (2014), a cinematic triptych showing a panoramic shot of a server room space along with its "natural" (although it is actually synthetic) sound: the white noise of fans and buzzing electricity. These spaces appear perfectly sterile and even aesthetically appealing, yet uninhabited, reminding us of what Liam Young, writing about the data centre belonging to Facebook, notes: "It is a landscape filled with our digital avatars, but strangely absent of people" (2019a, p. 8). Arnall thus directs our attention to the aesthetics of the contemporary, post-industrial machine landscape, which is at the same time hidden from the eyes of those who work to co-create its contents: the users of the World Wide Web.

In an interview, Young explains the interest of artists and theorists in this kind of spaces by the inherent contradiction they bring with:

[A]ll of these machine landscapes (...) structure our entire modern existence (...) but in terms of architectural space they're totally new because it's a space without people, it's architecture without occupants, it's a strange new phenomenon. But whether we like it or not, this is the typology that will define our time (Young, 2019b).

Therefore, according to Young, the data centre – a home to the Cloud – is an architectural object emblematic of the contemporary era, whereas in the past, these were successively: religious buildings, then factories (in the industrial age) and residential houses (as a result of modernists' dreams) and, in recent years, imposing edifices housing art institutions, rising almost all over the world.

An example of artistic analysis of such an object and its (an)aesthetics is provided by Emma Charles, in her film essay *Fragments on Machines* (2013), which takes up the theme of contemporary technical infrastructure "grafted" (Hu, 2015) onto a substance of industrial-era architecture. The camera guides the viewers' gaze along the trail of fibre-optic cabling running in the underground tunnels of New York City, to transmit the impulses needed to conduct high-frequency trading (HFT). Then, following the camera in a single long shot, we move from a clean and shiny, yet almost empty lobby in one of the buildings in the financial district, to the dark corridors of a technical back office housing dozens of servers and kilometres of cabling. During this cinematic journey we can experience the moment of transition between two different zones of machine landscapes: the so-called 'white'(representational) and 'grey' (utilitarian), respectively (Groen and Kuijpers, 2020). In both zones the presence of humans is highly limited, except for those whose activities are subordinate to the needs

of the machines, as their task is to keep the system running smoothly⁴. Those people “have to temporally re-calibrate their bodies to operate (...) providing companionship and care for machines” (Velkova and Plantin, 2023, p. 227).

The projects mentioned above direct the audience's attention to what is hidden behind the facade of the architecture of machine landscapes – the circulation of data that shapes our reality in its social, aesthetical and affective dimensions. This data is processed on a macro scale that exceeds the possibilities of our perception, similar to the hyperobjects described by Timothy Morton (2013).

Thus, widely promoted as a fundamental foundational myth, the invisibility of the Cloud interacts with the belief in its limitless space, which Hu compares to the Earth's atmosphere and the “belief in the air as the endless” one (2015, p. 66; Connor, 2010, p. 275). This can be linked to the metaphor of the Ouroboros applied by Bratton to express ecological concerns about the Cloud's energy needs and its negative impact on the environment (2015, p. 9, 93), noticed already a decade ago and not only by this author. Also James Bridle comments similarly: “The cloud is a new kind of industry, and a hungry one. The cloud doesn't just have a shadow; it has a footprint” (2018, p. 7), and of course it is a carbon footprint. It is in relation to this that Benjamin Bratton declares quite categorically that “the *Cloud* is not virtual; it is physical (...) There is nothing immaterial about massless information that demands such energy from the Earth” (2015, p. 29). This energy makes it possible to dispense with the use of paper (which Bratton calls the “dead tree medium”, the term introduced around 2006 in the context of press publishing), but it adds to the already massive carbon debt, which, at the time of writing this by Bratton, has already exceeded that of the aviation industry (2015, p. 94). Bratton, Bridle and Hu allude to the carbon footprint resulting from the Cloud's energy requirements, as well as the need to access water to cool the equipment and the emission of water vapour returning to the atmosphere in the form of anthropogenic clouds, with subsequent impact on the planetary climate. The weight of the carbon footprint can be determined by the location of a data centre, which was and still is powered by coal-based energy, therefore: “The long term consequences of the cloud are worlds away from the seductive ‘now’ produced by its real-time systems” (Hu, 2015, p. XXIV). The Cloud can be ‘dirty’ indeed, and the same problem of siting the technical infrastructure that sustains its viability is pointed out by both Bratton (2015, p. 116) and Hu (2015, p. 179). All these site-specific parameters have consequences for where the Cloud infrastructure is implemented, as well as affecting the realm in which the Cloud operates, that is the affective space of human life. It is pointed out by Vladan Joler in his concept of New Extractivism (2020), and earlier by Hu, when he noted that:

⁴ That is probably why the artist refers to Marx in the title of her project, although this is not an issue to be discussed in this text.

the cloud is a resource-extractive (...) technology, converting water and electricity into computing power (...). But it also turns human labour into a resource, (...) reveals the slow violence of the information economy, which extracts the naked life out of its 'human resources' (2015, p. 146)⁵.

More recently Nadim Samman's remarks similarly and rather bluntly:

The Cloud is a Green Zone, a Mac Store, a white cube. Everything else is earth, littered with bodies and discarded junk, scarred by terraforming and a War on Terror – to keep the wells open and the mines producing (2023, p. 30).

This remark proves clearly that the ambivalence of the Cloud is still present.

The theme of feeding the cloud with our life, attention and energy, and the emotional aspects of this process, is also present in Jenny Odell's project *Natural History* (2015), in which the artist combined images of a weather cloud and an interface element of a familiar social media platform in a simple collage. The invisible, yet affective aspects of the Cloud are also hinted at in Kyriaki Goni's work *Megastructures* (2016), with viewers looking at images of clouds on a screen that turn out to be a kind of Venetian mirror.



Fig. 3. Kyriaki Goni, *Megastructures*, 2016, 2019, screenshot. Photo courtesy of the artist.

⁵Apart from the reference to Agamben, the terms like: resource, slow violence and extraction belong to the vocabulary used mostly in connection with colonial occupation, when „violence is largely displaced elsewhere” (Hu, 2015, p. XXIX).

While people watch the installation in the gallery, oculographic examinations are made and the image of the person viewing the project is recorded. Then the Cloud reciprocates the human gaze, seeing even more in us than we are able to see in it.

CONCLUSIONS

Considering all this, we might be left with some doubts: what is the purpose of investigating the Cloud by exposing and demystifying things that seem obvious, neutral and without a hidden second bottom, like material infrastructure? Does it really help to gain any knowledge on the Cloud and its mechanisms? Especially when the “epistemology of exposure” often seems to be an ineffective method of operation, as Tung-Hui Hu points out, paraphrasing Eve Kosofsky Sedgwick (2015, p. 143). Nevertheless, it can be assumed that there is a cognitive value in this slightly forensic process itself, particularly when it is motivated by distrust of what constitutes the official image of a Cloud phenomenon and the narratives that support it. Maybe because, recalling one of the crucial theorists of media studies,

the hidden aspect of media are things (...) that have uncontrollable power when they are invisible. If these factors are ignored, they remain unseen and then have absolute power over the user (McLuhan, 1977, 4’44”).

Hence, the work of artists practising critical studies of infrastructure allows us to see it anew, including the smart metaphors that sustain false beliefs, especially in the context of the Fourth Industrial Revolution and its rhetorics.

Less than a decade ago Daphne Dragona and Dimitris Charitos traced artistic (both artistic and activist) initiatives to the search for alternatives, whose goal they saw as the possibility of “going off-the-cloud”. However, these attempts, made through tactical media art and explained by hacktivist methodologies, did not provide a viable answer to the range of problems that the Cloud and the data centres that store it, generate. Nowadays, it is apparent that little has changed in this regard, despite various efforts to make the Cloud a more transparent and inclusive structure. Imperial metaphors, ecological objections and a growing sense of confusion, aptly described by Bridle as the dawn of a “New Dark Age” (Bridle, 2018; Gail, 2016), are still being applied to the Cloud⁶. Whereas simple gestures of refusal, such as abandoning the platforms offered by the Big Tech giants with a monopoly on most Cloud services is not easy in practice, there are some proposals of resistance and collaboration

⁶ The term is taken from an article by US meteorologist William Gail (2016) identifying the “new dark ages” with the increasing difficulty of predicting weather and the unpredictability of climate phenomena despite advanced data interpretation techniques.

towards a different vision of a Cloud. Underlining the Cloud's overwhelming role in most of the processes that determine the functioning of the global "weightless economy" and considering seamlessness as its key feature, it is worth posing the question of possibilities of resistance and the search for alternatives to the monopolism of contemporary cloud infrastructures. Also, the impact on the environment begs the question of confronting this extractivist model and the possibilities of decolonisation of the Cloud. Is there a possibility of building something different, "able to accommodate multiplicity and difference and allowing us to be with each other in common, moving beyond relations of sovereignty" (Dragona 2019)? Due to the efforts of CI studies the Cloud that helps in developing the Fourth Industrial Revolution is at least more exposed, although it is still "a particularly silent piece of infrastructure" (Hu, 2015, p. X). Also, as James Bridle noted several years ago:

By understanding the way the figure of the cloud is used to obscure the real operation of technology, we can start to understand the many ways in which technology itself hides its own agency – through opaque machines and inscrutable code, as well as physical distance and legal constructs (2018, p. 8).

Critical infrastructure studies, including artistic format of analysis, reveal the invisible but brutally real extractivism of 'naked infrastructure' masked by generic architecture of the Cloud and inscribed in the smartly designed aesthetics of the user-friendly interfaces.

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DEMISTYFIKACJA CHMURY JAKO NIEWIDZIALNEJ TECHNOLOGII: ASPEKTY ESTETYCZNE, PRZESTRZENNE I AFEKTYWNE W SZTUCE I STUDIACH NAD INFRASTRUKTURĄ KRYTYCZNĄ

Streszczenie

Artykuł podejmuje temat technologicznej Chmury jako jednej z cech czwartej rewolucji przemysłowej. Koncentruje się na ambiwalencjach Chmury, omawiając jej różne aspekty estetyczne, przestrzenne i afektywne. Metody podejścia do zjawiska Chmury są rozwijane zarówno w teorii, w dyscyplinach studiów nad infrastrukturą krytyczną (CI) i naukach o sztuce, jak i w praktyce sztuk wizualnych. Główne stanowiska teoretyczne, z których czerpie artykuł, zostały opracowane przez Benjaminą H. Brattona, Jamesa Bridle'a i Tung-Hui Hu. Artykuł przedstawia również pokrótce historię studiów nad CI wraz z ich głównymi obszarami badawczymi (np. studia nad centrami danych) oraz przykładami z dziedziny sztuki. Kwestie poruszone w artykule obejmują: niewidzialność i niedostępność chmury (jako hiperobiektu sieciowego i infrastruktury technologicznej), architekturę centrów danych i niejednoznaczną relację, jaką chmura ustanawia ze swoimi użytkownikami, a także kwestie ekologiczne. Chmura jako niewidzialna technologia jest omawiana z wielu perspektyw, od tej, która wprost wspiera jej rozwój, po te, które próbują zdemistyfikować jej pozornie niematerialny obraz i krytycznie wskazać jej relacje z ekstraktywizmem, a także zasugerować propozycje oporu.

Słowa kluczowe:

Chmura, krytyczne studia infrastruktury, niewidoczna technologia

Joanna Szczepanik

 <https://orcid.org/0000-0002-6371-4161>
West Pomeranian University of Technology, Szczecin
jszczepanik@zut.edu.pl

FROM HAL 9000 TO NEO-LUDDISM. WHO'S AFRAID OF TECHNOLOGY? REFLECTIONS ON THE CATEGORY OF EXPERIENCE

Abstract

The article analyzes the phenomenon of technological anxiety, which is an inseparable element of the 4th Industrial Revolution, and its reverse. At the level of the individual, technological challenges open up, intensified by the excess of stimuli caused by information overload. In this context, the concept of the 4th Industrial Revolution proposed in 2016 by Klaus Schwab is juxtaposed with theoretical proposals such as Neil Postman's "Technopol", the reflections of James Ellul, or the radical manifesto of eco-terrorist Ted Kaczyński, concerning the future of industrial society. The article also attempts to define and indicate the sources of technological anxiety, from the feeling of uncertainty, dependence, exclusion, to the loss of control over the world and man himself. The frame is a reference to the text of culture in the form of the figure of the Hal 9000 computer from Stanley Kubrick's film as a machine making decisions about human life and to the contemporary phenomenon of neo-Luddism inspired by the 19th movement of opponents of the development of technology. Methodologically, the article is based on the subject's literature and the analysis of popular culture texts. It also uses exemplification from the area of contemporary art, reaching for the category of artistic research.

Keywords:

technological anxiety, experience, artificial intelligence, cultural research, neo-Luddism



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INTRODUCTION

Taking up the topic of technological anxiety has two main sources of inspiration. The first is participation in the CAPHE – Communities and Artistic Participation in Hybrid Environments Project¹ research project and confrontation with the publication inspiring this research, Klaus Schwab's manifesto entitled "The Fourth Industrial Revolution" (2016). The second is a reflection on the enthusiasm for technological challenges on the part of humanities researchers and artists participating in the project. I confront this enthusiasm with the individual experience of excess, saturation of the senses with technological stimuli, both visual, sound, as well as information-related – intellectual. And yet aesthetics itself concerns the senses, through them we experience reality. The article, which is the result of reflection on the possibilities of human perception in accordance with or against its evolutionary constitution, attempts to answer the question of how willing we are to admit to fear of technology, if we feel it, or to what extent we are conscious of it. This problem fits into the broader context of civilizational changes that force adaptation of every sphere of life to introduced standards in the form of ever newer tools. Is there still a place for the analog world? The article, which attempts to define the sources of technological fear, from a sense of uncertainty, dependency, exclusion, to loss of control, may be an important voice in reflection on the well-being of especially those users of technology in whom it arouses various types of anxiety.

The development of technology undoubtedly brings with it many benefits, possibilities and hopes. At the same time, however, a number of concerns arise. Although the juxtaposition of enthusiasm for new achievements with skepticism towards them is one of the primary experiences of human development, technological fear can be felt especially in recent years, in connection with the rapid development of large language models (Large Language Model) called artificial intelligence. An important circumstance for the discussed issue was the launch of the GPT chat in November 2022 in free access. The article therefore analyzes the phenomenon of technological fear, which is an inseparable element of the 4th industrial revolution, its reverse, as it were.

The main interpretative framework is a critical reflection on the attitude of openness towards new technologies, and its starting point and main context, the author's personal participation in a research project analyzing art in technologically advanced environments. At the same time, taking up the topic of fear of technology is the result of the perspective of a researcher and lecturer embedded

¹ The article presents the issue given as part of the 4th Communities and Artistic Participation in Hybrid Environments Project and Polish Association for Aesthetics Seminar entitled "Aesthetic Experience in the Times of the Fourth Industrial Revolution and Technological Anxiety", which took place in April 2024 in the space of the Forma Gallery at the Faculty of Architecture of the West Pomeranian University of Technology in Szczecin (Poland).

in the traditional structure of a university, in which students of architecture are taught traditional drawing, painting and sculpture. The adoption of the perspective of the CAPHE research project generates reflection on the extent to which traditional forms of art still have a reason to exist in universities, as well as outside them. The question arises whether we are dealing with a gradual appropriation of the area of art by new technologies? At the same time, the article is part of the cultural studies reflection on the study of culture in its relationship with technology, analyzing it in the area of the academy and academic disciplines, so it is an example of meta-reflection.

LITERATURE AND CULTURAL TEXTS

Klaus Schwab, an outstanding economist and founder of the World Economic Forum, calls the “Fourth Industrial Revolution” (2018) our contemporary civilizational moment, symbolized by the development of artificial intelligence. He distinguishes three earlier revolutions symbolized by the steam engine, the light bulb, and the computer. According to the author, the revolution will encompass the entirety of our world, and we have a chance to influence its shape.

A diametrically opposed image of technology emerges from the controversial manifesto “Industrial Society and Its Future” (Kaczynski, 2003), an extensive ideological essay analyzing the threats that technology poses. Its author, Ted Kaczynski, responsible for bombings in which many people suffered, has become a symbol of eco-terrorism and extremism in the United States. As a promising mathematician at the beginning of his academic career at the University of Berkeley, he abandoned this path to adopt a radically anti-technological attitude, driven by the conviction of the negative impact of technology on human life. His actions in the years 1978–1995 contributed to the deaths of several people.

Neil Postman, an American philosopher, media expert and cultural critic, also presents a techno-pessimistic attitude. The author of “Technopol” (Postman, 1995), expresses his belief in technical determinism, which dates back to the second decade of the 20th century. He outlines a vision of a society for which efficiency is the primary goal, and what cannot be measured has no value. Jacques Ellul (2021), on the other hand, a French philosopher and sociologist, identifies technology with excess, pointing to the costs that humanity pays when deciding to abandon the rhythm of life consistent with tradition and nature. In his opinion, the key task of technology is progress regardless of the ability of members of society to adapt to it.

Some researchers pay special attention to the care for preserving what is typically human and what allows us to maintain separation from machines, i.e., our autonomy. The polymath, winner of the Turing Award and the Nobel Prize in Economics, Herbert Simon, whose research contributed significantly to the

development of artificial intelligence, emphasizes that “the wealth of information creates a poverty of attention” (1971). The American historian Timothy Snyder also points to attentiveness and unpredictability as features that distinguish humans from machines in a conversation with Krzysztof Czyżewski recorded at the Miłosz Manor in Krasnogruda, entitled “What is the world sick of?” (2021).

The issue of the culture of excess and “poverty of attention” is also referred to by sociologist Magdalena Szpunar in the publication “Cultural Imperialism of the Internet” (2017). In another text, “Culture of (not only) technological fear” (Szpunar, 2018, p. 117), the author invokes the concept of Angst Generation, fear of technology that is the result of the work of software developers, incomprehensible and mysterious to most people. The context of fear of what we depend on is also taken up by Tadeusz Sławek in the article “Lukrecjusz i Defoe. Dwie lekcje lęku” (2012), and Dariusz Brzostek in the text “Lęk przed maszyną i lęk (z) maszyny. Sztuczna inteligencja i technolęki Stanisława Lema (2018)” points out that the more advanced the technology, the more dangerous it is.

In my analysis, I would also like to refer to the project of the artistic collective Computer Lars (Asker Bryld Staunaes and Benjamin Asger, 2022), which consisted in creating a political party headed by the artificial intelligence chatbot Leader Lars. The program of the Synthetic Party (Det Sintetiske Parti (DSP)), established in 2022 with the intention of participating in the parliamentary elections in 2023, represents the political programs of groups that have been gaining some support since the 1970s, but have failed to enter parliament.

The hopes, as well as the fears connected to technology, are also an important topic in popular culture. A representative example might be a figure-hero of Stanley Kubrick’s film “2001: A Space Odyssey” (1968), the Hal 9000 computer. The film, which depicts the evolution of humanity from the Stone Age to the interstellar future, explores the subject of artificial intelligence, remaining one of the most enigmatic and symbolic images in the history of cinema. According to the plot, in the early 1990s, Hal 9000 was the most advanced computer project in the field of artificial intelligence. Installed on the Discovery One spacecraft, it was to control the course of a scientific mission from the Moon to the orbit of Jupiter, to examine a monolith identical to the one whose appearance in prehistoric times initiated the use of tools and the development of intelligence. At first, Hal 9000 behaves like a flawless, polite and rational system, but over time it begins to show signs of anxiety. When it predicts a system failure, which turns out to be false, the astronauts begin to suspect its unreliability. Soon the machine decides to eliminate the crew to “secure” the mission. However, it is outwitted by the human, and its memory modules are gradually disconnected. The dialogue between astronaut Heywood

Floyd and the computer has gone down in history as a metaphor for the fear of technology that shows its own consciousness and independence from human will, and even decides about its life. HAL 9000 becomes a symbol of technology that has taken on too many responsibilities without enough ethics or understanding of human intentions. At this point, we can refer to Bruno Latour's sociological actor-network theory, presented most fully in the publication "Splicing the Social" (2005), emphasizing the agency of non-human factors. Renata Tańczuk's analysis, contained in the article "On the autonomy of the 'self' and nature also refers to it. Some Notes on Old Fears in a New Technological Scenery" (2018), concerns the phenomena of hybridization and cyborgization in cinema and popular culture. The author points to the phenomenon of fear of the potential loss of humanity and the inability to distinguish humans from machines.

The last part of the article is a presentation of the phenomenon of neo-Luddism as a contemporary form of resistance referring to historical Luddism, the nineteenth-century British anti-technology movement. Antonio Lucci and Andrea Osti in the article "Exit (digital) humanity. Critical notes on the anthropological foundations of 'digital humanism'" (2024) refers to Kickpatrick Sale's concept of defining neo-Luddism as "a range of ideas and feelings" encompassing intellectuals skeptical of the industrial revolution.

CO-PRESENCE OF TECHNOLOGY

Undoubtedly, the current living environment is dominated by technology, even if we do not have such an impression at the level of everyday life. Technology serves to improve administration, communication, health care, and other areas of social, political, and economic reality. Gradually, the scope of its use is increasing, encompassing more areas previously handled by humans. However, this change may be occurring too quickly compared to the slow evolution of human mentality. Depending on the availability of tools and generational conditions, we feel adept at using it to varying degrees. The inability to keep up with mastering the introduced tools arouses frustration and fear in many people. It can take the form of technophobia, a difficult-to-explain aversion or discomfort resulting from the need to use technology. This is associated with another type of fear, namely the fear of social exclusion related to intellectual or material barriers. However, the type of fear that is ultimately being expressed most clearly concerns the development of artificial intelligence and its wider introduction to the labor market. However, this is not a new phenomenon, if we consider that already at the beginning of the 19th century, with the Luddites' rebellion, concerned about the introduction of weaving machines, the fear of

technology was so strong that people decided to destroy them despite the death penalty.

Human nature is subject to constant change and perhaps in the future we will tame the tools that arouse fear today. In the meantime, however, evolution is progressing much slower than technological development, and access to hybrid environments characterized by high immersion, although undoubtedly attractive, is still a rather elitist experience, concerning a proportionally small group of people.

INDUSTRIAL REVOLUTION AS CONTEXT

Klaus Schwab considers the primary task of the publication “The Fourth Industrial Revolution” to be “defining the way in which technology and society coexist” (2018, p. 20), and more specifically, to increase awareness of the pace of the industrial revolution and its effects, to create a framework for thinking about this revolution and to create a forum for cooperation. In his opinion, we are at its initial stage. At the same time, it reminds us of the location in the Anthropocene, an era characterized by the dominance of human activity. The author also admits that the book was inspired by the activities of the World Economic Forum and the many meetings and conversations with representatives of companies, politicians, and young leaders that resulted from it. Such a context is not without influence on the image of the world, it also affects the tone of the publication. Schwab himself points to a clear polarization within society. Those who do not adapt to technological changes will be losers, and those who adapt will be winners.

We can observe polarization to an unprecedented degree – those who are ready for change and those who resist it. (...) This ontological inequality separating those who adapt and those who resist – basically winners from basically losers, in every sense of the word. The winners may even benefit from some forms of radical human improvement, produced by some segments of the fourth industrial revolution (such as genetic engineering), that the losers will not have a chance for. This threatens to provoke class and other conflicts, unlike anything we have ever seen (Schwab, 2018, p. 125).

One can easily imagine that a talented young man with leadership qualities is among the people whose deep reflection on the world could inspire the concept of a thinker such as Klaus Schwab. However, it could happen differently and this outstanding young man could adopt a position that is diametrically opposed, as Ted Kaczynski did. In his manifesto against industrial society, he points out that “it seemingly satisfies the basic needs of the individual, but in return demands unconditional obedience” (Kaczynski, 2003), which leads to the

individual giving up autonomy, and at the supra-individual level “the technical-industrial system leads to the erosion of human dignity” (Kaczynski, 2003). The author of the manifesto “Industrial Society and Its Future” sees technology as a tool for serving key forms of state organization, including education, which has become a technique for controlling the development of young people in a conformist way, responding to the needs of the system. There is a clear parallel with the model of the entrepreneurial university, which sets itself the primary goal of educating staff for the needs of the economy.

Neil Postman dates the beginning of technopoly in the history of Western civilization and culture to the second decade of the 20th century (1995). He points out that before technopoly appeared, humanity was attached to tradition and symbolic order. Only education allows us to understand the process of technological change and to assume the role of an agent, not a passive object of its action. The author’s image of a society that believes that the only goal of work is efficiency, and what cannot be measured either does not exist or has no value, seems very similar to our contemporary reality. This is particularly visible from the perspective of a humanist or artist representing the academic community, in the context of the so-called third evaluation criterion, which assesses the impact of research results on society and the economy.

At the same time, the more technology in our environment, the greater the need for closeness, direct contact with another person, social bonds. Schwab also notes this, citing research indicating a decline in empathy over the past 2–3 decades (2018, pp. 128–129). According to research by the Massachusetts Institute of Technology in 2015, 44% of teenagers have never turned off their electronic devices (Kruszewska). The lack of direct contact will affect the functioning of the senses in relationships with another person, the ability to listen, maintain eye contact or recognize body language. Constantly being connected to the network is a serious problem for adults who have difficulty initiating a normal conversation or focusing their attention. Children, who have much less developed tools to control their emotions, are particularly vulnerable to their influence. This also applies to surfing the Internet, or rather surfing its surface, which generally reduces the perception of reality.

Timothy Snyder shares his observations about his friends who hold high positions in companies creating advanced communication technologies in Silicon Valley, who, being aware of the civilization diseases caused by technology, forbid their children from using smartphones and choose schools for them without computers. The people who create these tools therefore try to delay as much as possible the moment of introducing advanced tools into their own lives, into the soil of their own family to protect it from their harmful effects. The author thus emphasizes the importance of direct contact with another person in maintaining freedom from the influence of social network algorithms. In his opinion, a typical human feature is unpredictability, which can

be found only in face-to-face conversation or poetry (Snyder, 2021). The above perfectly illustrates the statement of Herbert Simon that

the wealth of Information creates a poverty of attention and creates the need for its efficient distribution among the excess of information sources that can absorb attention (1971).

According to Jacques Ellul, the key task of technology is progress, regardless of the costs incurred by the individual. The new technological order forces us to adapt to its rules, and the inability to do so results in disability and exclusion (Ellul, 2021). This aspect of criticism of technological development is also included in Kaczynski's manifesto, which claims:

You cannot induce rapid and drastic changes in the technology and economy of society without also causing rapid changes in all other aspects of society, and that rapid changes inevitably destroy traditional values. (...) The breakdown of traditional values to some extent presupposes the breakdown of the bonds that hold traditional small social groups together. (...) In modern society, an individual must be loyal first to the system, and only then to the small community (2003).

TECHNOLOGICAL ANXIETY – WHAT IS IT?

In the historical perspective, the development of technology occurred as a result of man's desire to dominate nature, and tame it. In European thought, the late Renaissance thinker Francis Bacon is considered the initiator of the view that science has utilitarian tasks. At this stage, it seems that although the human species has a large knowledge of the effects of influence on natural processes, it is not able to fully predict the effects of civilization development. However, what is unknown, uncontrollable, arouses fear. In the article devoted to the culture of fear, Magdalena Szpunar points out that some researchers directly speak of a culture of fear with a special feature in the form of "creating uncertainty" and the formation of a generation of fear (Generation Angst). The author points out that technology generates fear, among other things, because it is "the product of the activities of enigmatic programmers, whose world of binary code is as incomprehensible to us as it is terrifying" (Szpunar, 2018, p. 20). We fear what we do not understand. Technology is blamed for the destruction of the natural environment (Heidegger), condemning the individual to loneliness ("loneliness on the web"), and also for the degradation of our personality. But since it has the power to act, it is also an actor (according to Bruno Latour's actor-network theory), a non-human entity, because it modifies another entity, that is, us, the human being. The danger is that we do not notice

its impact, it is as if neutral to us. If fear is “the recognition of the power of what is beyond me and on which I am dependent” (Sławek, 2012, p. 24), then technology is its main source today.

Technology creates a completely different living environment than the one to which evolution has adapted us. A good example is a sedentary lifestyle. What we would look like if we were evolutionarily adapted to spend so much time in means of transport is shown by the result of cooperation between Australian artist Patricia Piccini and a trauma surgeon, a specialist in road accidents. “Graham” (2016) is a sculpture resembling an enhanced version of a human, better adapted to a sedentary lifestyle in means of transport. Evolutionarily, the process of adaptation to changes is on, but it is certainly very long and finally, none of us would like to look like Graham. His flat face and huge head surrounded by a layer of fat attached directly to the ribs without a neck do not fit into the aesthetically desirable physiognomy.



Fig. 1. Patricia Piccinini, *Graham*, 2016. Silicone, human hair, life-size sculpture. Australia, 2016. Photo by Transport Accident Commission of Victoria, Australia, CC0.

Another type of fear is resistance to technological innovations among employees of industry 4.0. Joanna Moczyłowska examines this phenomenon from the perspective of psychology.

Fear is one of the primary emotions that humans struggle with. Initially, it was nature, animals, or simply the unknown and incomprehensible. Currently, technology is taking over the role of the “Other”. It is estimated that various anxiety disorders affect about 20% of the population, and in the case of

technophobia, it is even 1/3 of the population. What is more, people experiencing technophobia are discriminated against, and their aversion to new technologies causes them to have significantly more difficult access to the job market (Moczyłowska, 2022).

Another challenge is to start using new technologies and master them quickly. People are ashamed that they will not be able to handle it. When they are unable to master them, they feel excluded. This is a special type of technophobia – the fear of not understanding a device based on a given technology, the consequence of which is most often the lack of attempting to master the use of this device. Another type of fear is the fear of technology being used against a person by companies or corporations for commercial purposes, or taking over personal data. The remedy for this type of fear could be digital minimalism, although in practice, conscious resignation from participating in the digital world, having an encrypted email box and not leaving traces of one's existence on the Internet, requires a lot of consistency and know-how.

FEAR OF THE MACHINE AND THE HEGEMONY OF TECHNOLOGY

The symbol of fear of the machine remains Hal 9000 – the non-human protagonist of Stanley Kubrick's 1968 film. His visual signal resembling a red eye, his ability to read lips flawlessly, and his dispassionate voice arouse anxiety. This figure finds its sources in literature, such as "Moxon's Master" (1899) by Ambrose Bierce, "With Folded Hands" (1947) by Jack Williamson, "Plus" (1977) by Joseph McElroy, or even "Frankenstein" (1818) by Mary Wollstonecraft Shelley, considered to be the forerunner of the science fiction genre. In line with his concept of communication as information, Marshall McLuhan drew attention to reciprocal action: first, we create our tools, and later they influence and shape us. Renata Tańczuk, on the other hand, wrote:

One of the essential elements of fear of technology is the fear of losing humanity, the threat of machines that increasingly resemble us, and therefore of the inability to distinguish between what is human and what is non-human. (...) It is not things, technical devices, machines that are our tools, but we who become their instruments. On the one hand, this blurring of the boundaries between the human and the non-human takes place within the human person (hybridization, cyborgization of humans), and on the other – outside of them, in the machine itself, for example in an android or artificial life, a replicant. (Tańczuk, 2018, p. 22).

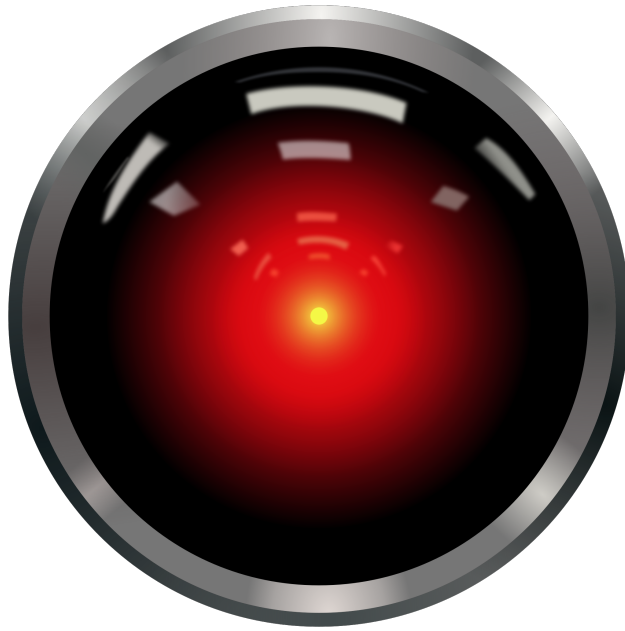


Fig. 2. The red camera eye of HAL 9000 from Stanley Kubrick's movie "2001: A Space Odyssey", 1968. Frame from the movie, 2010. Photo by Cryteria, CC 3.0.

The antitechnological manifesto of Kaczynski also pointed to the danger of human dependence on the will of the machine:

We may reach a level where the decisions necessary to maintain the system will be so complex that human beings will not be able to intelligently understand them. Then machines will gain control. People will not be able to simply turn them off, because they will be so dependent on them that turning them off would be tantamount to suicide (2003).

Are we therefore ready, as citizens, to put our fate in the virtual hands of artificial intelligence? The artistic project of the Danish Synthetic Party (2022) with a chatbot based on artificial intelligence as its representative becomes an exemplification of accepting the existence of non-human beings. In an artistic event that took place in November 2024 at the Academy of Fine Arts in Gdańsk, two chatbots clashed as part of the first-ever debate between virtual politicians. Leader Lars from the Danish Synthetic Party and the candidate for the President of the Republic of Poland in 2000, Wiktoria Cukt, created by the Central Office of Technical Culture collective from Gdańsk, led a duel of arguments that included terms suggesting a high degree of awareness of place and time, and even fears of being replaced by improved AI versions soon (Szczepanik, 2025).

An interesting proposal also seems to be the postulate of the creators of Leader Lars, collective and the associated tech hub and MindFuture foundation, to add one more, the eighteenth, "Life with artificial intelligence" to the existing 17 points of sustainable development in order to ensure ethical and safe integration of non-human beings with humans and society. Official documents of national and international institutions mention human beings, but this is always accompanied by a note on maintaining the leading and supervisory role of humans, an example of which is the communication of the European Commission (2019, p. 3), which talks about building trust in artificial intelligence but focused on humans. An interesting question remains what knowledge about ourselves and society do we gain through observation and participation in this type of project? What kind of knowledge does art offer us?

As Jacques Ellul and other researchers have pointed out, development is inscribed in the essence of technology, giving it the role of hegemon. The reason is the constant insatiability of its creators, inventors, and entrepreneurs. Kaczynski distinguishes between small-scale technology used by local communities, such as agriculture, and large-scale technology, dependent on social organization (2003). While the former dominated before the first industrial revolution, the latter has dominated since the 19th century. Dariusz Brzostek, quoting Stanisław Lem, describes this phenomenon figuratively:

Of course, progress gives rise to problems, such as the fact that if you break, say, a few spokes in a horse-drawn carriage wheel, you can only fall into a ditch, but if you break a few spokes in a turbojet, that's a bigger problem (2018, p. 14).

NEO-LUDDISM

The figure of the neo-Luddite initially appeared in this article as a counterpoint, but rather anecdotal. It resulted largely from the fear of using this term in a forum of serious scientific discussion, because it is not appropriate to admit to one's own (neo)Luddism. Kickpatrick Sale, a writer and publicist, an activist of the ecological movement, while arguing about neo-Luddism as a contemporary form of resistance, defines neo-Luddites as people suffering from technological changes caused by globalization and ideologically fighting against the concept of progress that threatens traditional social relations. Neo-Luddites promote alternative technologies, on a human scale, understandable and not addictive, in the creation of which people are directly involved. On the other hand, they reject nuclear, chemical, engineering, and digital technologies, which contribute to the destructive impact of technology on the planet and other living species. In Sale's opinion, neo-Luddism as a "scope of ideas and feelings" includes a respectable group of intellectuals skeptical of the industrial revolution and indicates the

heroes of this idea: Jacques Ellul, Martin Heidegger, Paul Goodman, Herbert Marcuse, Ernst F. Schumacher, and Neil Postman (Lucci and Osti, 2024). In Antonio Lucci and Andrea Osti's analysis, another type of Luddism is also worth noting, one that is particularly close to my heart, namely methodological neo-Luddism. It postulates a critical analysis that involves, among other things, avoiding the rhetoric of demonization, and rejecting the temptation to appeal definite to a human essence, adopting the idea of man "extended to every possible humanity" (Lucci and Osti, 2024). The authors cite the definition proposed by Langdon Winner, indicating that methodological ludism is based on a critical analysis of the participation of technology both in everyday life and in relation to the long-term effects of its presence. Winner indicates that, although technology cannot be "disappeared," it is possible to temporarily "disconnect," suspend our dependence on it in order to create a space for reflection on its impact on humanity. Creating such a space gives the potential for the emergence of new configurations on the human-technology line (Lucci and Osti, 2024).

Historically, in the 19th century, Luddism was a reaction to the threat of losing one's job, an opposition to technology that directly threatened the existence of a community. In this sense, it finds a place in the contemporary debate on the future of the labor market, especially if we take into account the report of scientists from the University of Oxford, who estimated that in the coming years almost half of the jobs performed by the so-called white collars (a term introduced in American sociology, most often identified with employees employed in the public sector) are threatened by automation. Looking at Luddism as a historical phenomenon, Lucci and Osti also point to the approach according to which this movement was interpreted as a kind of carnival manifestation of "street theater", a subversive satire, which is associated with Richard Schechner's concept of social ritual, symbolically restoring order.

The reaction to technology overload is also observed in various initiatives by a generation of teenagers raised in the digital world. At the turn of 2022/2023, The New York "Times" described a group of friends from an American high school, whose members call themselves the Luddite Club, i.e. those who refuse to use technology (2022). They do not use mobile phones, and if they do, it is without access to the internet. In accordance with the rules prevailing in this small community, they meet regularly without the possibility of changing plans at the last minute, which is possible thanks to instant messaging. Most of them did not want to face the pressure of social applications such as Instagram, TikTok and Twitter, in the form of the need to constantly publish posts. Lola Shub is indicated as the leader of this movement, who describes herself as a "screenager", i.e. a teenager who really exists only in front of the screen and through the screen. As she herself declares, the flip phone changed her life (2022). I imagine that Lola Shub could become the Greta Thunberg of technology. The threats caused by the use of technology, especially among

children and young people, are quite well researched, and knowledge about them is widespread: addictions, eye diseases, spine diseases, transfer of social life to the network. However, it is very difficult to cut yourself off from IT technologies today, because it carries the risk of digital exclusion, and consequently also social exclusion.

EXPERIENCE – A STORY OF DANCE

Michał Ostrowicki, also known by his avatar's pseudonym Sidey Myoo, a philosopher involved in electronic art, argues that people like being in the metaverse (Myoo, 2024). The reason may be the fulfillment of social needs, but also the fulfillment of one's dreams, which, for example, may consist of activities such as dancing. The body connected to Oculus glasses becomes light and agile, and is also realized in the social sphere.



Fig. 3. The article's author experiences the interactive installation "Oedipus in Search of Colonus" by Loukia Alavanou, Onassis Stegi, Athens 2023. Courtesy of Barbara Nawrocka.

I can relate this observation to my personal encounter with the metaverse software. Initially, it was characterized by reluctance. At first, I did not want to take it out of the box for a few days. However, after putting it on and initially testing it, I quickly decided that I would like to have such a device at hand all the time. The attractiveness of virtual reality is as well recognized as a threat resulting from the development of technology. At the same time, the fact that such experiences benefit, for example, medicine, is indisputable. Through participation and immersion, we can remember much better, because we have access to more data. Before the Oculus era, we could connect sight with other senses, such as balance, based on arbitrary associations, which was closer to the way our brain works. VR software makes it possible to include other senses directly in the experience. The challenge, however, is to translate this experience into language. The experience is sensual, intuitive, and the narrative is linguistic, rational, logical. Perhaps a performative formula or the aforementioned poetry would convey the nature of the experience more accurately than language immersed in ratio. Although tools change us while we use them, the analysis must take place on the level of interaction.

Ultimately, it is experience that becomes the key concept, activity, and action, not only in the context of the Polish Society of Aesthetics seminar and the CAPHE project. During our meetings, we tried to look at this in the field of science and the humanities. The question of experience is a question about the way of existence. Human nature is changeable, and technology is not a counterweight to it.

And although one can approach Klaus Schwab's proposal critically and unsuccessfully seek a place for art and culture as carriers of value independent of the economy, one should agree with the author on one thing:

We should treat even a drastic technological change as an invitation to reflect on who we are and how we perceive the world. (...) Thanks to this, we will gain more opportunities to shape the revolutionary changes taking place in such a way that the world becomes better and better (Schwab, 2018, p. 20).

In the context of technological anxiety, however, the high percentage of people with a technophobic attitude is particularly surprising. It is often associated with discomfort resulting from difficulties in mastering technology in the face of social position or status. Over time, however, a person will gradually get used to changes. In the case of representatives of the younger generation, who master technology with ease, the issue might be that they suffer from a lack of mindfulness. There may also be a fear of becoming a "screenager", a person who feels that they exist only with and through a smartphone. It takes time and patience, as well as good will and courage of educators who, using a historical perspective, will explain what knowledge about technological development

gives us and will sensitize us to those areas that may pose a threat. Such individuals who take up challenges in the form of breaking their own barriers are certainly researchers of new technologies open to experience. In this way, I return to the category of experience as key not only for the title of the seminar, but also for human being in the world, which is in constant motion, in the process of becoming. This variability, interpenetration, also concerns the relationship between man and technology.

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OD HALA 9000 DO NEOLUDDYZMU. KTO SIĘ BOI TECHNOLOGII? REFLEKSJE WOKÓŁ KATEGORII DOŚWIADCZENIA

Streszczenie

Artykuł analizuje zjawisko lęku technologicznego stanowiącego nieodłączny element IV rewolucji przemysłowej, niejako jego rewers. Na poziomie jednostki otwierają się wyzwania technologiczne, potęgowane przez nadmiar bodźców powodowanych przesytem informacji. W tym kontekście koncepcja IV Rewolucji Przemysłowej zaproponowana w 2016 roku przez Klausa Schwaba zestawiona zostaje z takimi propozycjami teoretycznymi jak „Technopol” Neila Postmana, refleksje Jamesa Ellula, czy radykalnym manifestem eko-terrorysty Teda Kaczynskiego, dotyczącym przyszłości społeczeństwa przemysłowego. Artykuł podejmuje także próbę zdefiniowania i wskazania źródeł lęku technologicznego od poczucia niepewności, zależności, wykluczenia, po utratę kontroli nad światem i samym człowiekiem. Klamrę stanowi nawiązanie do figury komputera Hal 9000 z filmu Stanleya Kubricka jako maszyny podejmującej decyzje o ludzkim życiu oraz do współczesnego fenomenu neoluddyzmu inspirowanego dziewiętnastowiecznym ruchem przeciwników rozwoju technologii. Metodologicznie artykuł opiera się zarówno na lekturze prac teoretycznych, jak i na analizie tekstów kultury popularnej. Posługuje się także egzemplifikacją z obszaru sztuki współczesnej sięgając do kategorii badań artystycznych.

Słowa kluczowe:

lęk technologiczny, doświadczenie, sztuczna inteligencja, badanie kultury, neoluddyzm

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tel. (42) 635 55 77