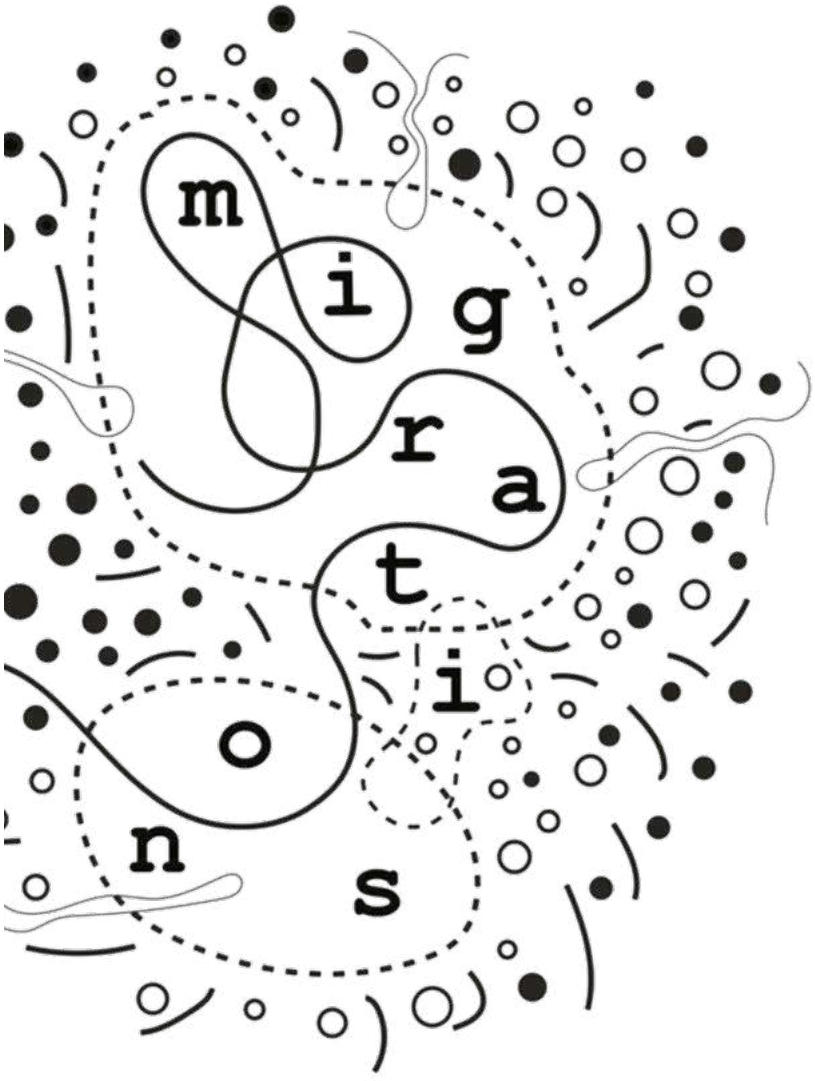
Migration, Climate, Surveillance: What Does Media Art Complexity Want?

Session 5



Session 5
Migration, Climate, Surveillance: What does Media Arts Complexity want?

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The title of our session is connecting several variables that are being negotiated for the first time at a CIHA conference. Among the big questions of our time, caused by the digital revolution, the population explosion and the further growth of the carbon societies, questions, above all thematized by media art, are undoubtedly migration, climate, and surveillance: Exhibitions, even entire festivals are dedicated to these topics.

In terms of science policy, media art, and its histories have been negotiated since 2004 through the established MediaArtHistories world conference series, which began in Banff, Canada, and since then took place every 2 years on a different continent. On our web archive mediaarthistories.org, you find documentation of hundreds of lectures, abstracts and articles from this growing field. It is a great pleasure and an important date that this field, which has evolved parallel with CIHA over the last 2 decades, is making, we hope, productive intellectual contact, a beneficial merger in terms of science policy.

MediaArtHistories is an interdisciplinary field of research that explores the current developments as well as the history and genealogy of new media art, digital art, and electronic art (Grau 2007, Domingues 2009).[1] On the one hand, media art histories address the contemporary interplay of art, technology, and science (Wilson 2010, Henderson 1983).[2] On the other, it aims to reveal the historical relationships and aspects of the 'afterlife' (Aby Warburg) in new media art by means of a historical-comparative approach. This strand of research encompasses questions of the history of media and perception of so-called archetypes, as well as those of iconography and the

history of ideas. Moreover, one of the main agendas of media art histories is to point out the role of digital technologies for contemporary, post-industrial societies and to counteract the marginalization of according art practices and art objects as pointed out in 2011, in the Liverpool Declaration: “Digital technology has fundamentally changed the way art is made. Over the last fifty years, media art has become a significant part of our networked information society. Although there are well-attended international festivals, collaborative research projects, exhibitions, and database documentation resources, media art research is still marginal in universities, museums, and archives. It remains largely under-resourced in our core cultural institutions.”[3] Hence, scholars stress that the technological advances in current media cultures are best understood on the backdrop of extensive media and art history. Contributions to this field are widespread and include researchers who have disciplinary focuses such as the history of science (Lorraine DASTON), art history and image science (Oliver Grau, Barbara Stafford), media studies and media archaeology (Friedrich Kittler, Erkki Huhtamo, Siegfried Zielinski), sound studies (Douglas Kahn), film studies (Sean Cubitt, Jorge La Ferla), media art aesthetics (Christiane Paul, Giselle Beiguelman, Lev Manovich), archives (Grau, Beiguelman).[4]

The term new media art itself is of great importance to the field.[5] The focus of new media art lies in the cultural, political, and social implications as well as the aesthetic possibilities – more or less its ‘media-specificity’ – of digital media. Furthermore, the field of new media art is increasingly influenced by new technologies that surmount a traditional understanding of (art) media. The list of genres that are commonly subsumed under the label of new media art illustrates its broad scope and includes, among others, virtual art[6], Software Art[7], Internet Art[8], Glitch Art[9], Telematic Art, Bio Art / Genetic Art[10], Interactive Art[11], computer animation and graphics[12], Urban Media Art[13], Mobile Art.[14] These latter two ‘genres’ in particular have a strong focus on the interplay of art and (political) activism.[15] Recently, with the development of Artificial Intelligence, there is also an emerging trend exploring its aesthetics and, at the moment, the art market. A transforming Art Market - which ignored meanwhile 6 decades of digital art often representing our time like in a concave mirror - is currently blinded by the financial promise of NFTs.

The diversity of fields makes clear that digital art is a complex system, which is not only complicated but has rapidly-accelerating complexity. With the Algorithmic, Computational and even Post-digital turn over recent decades, the digital image is becoming contextual, ephemeral, immersive, interactive and processual, made as it is out of many technologies.

This session addresses the role Media Art plays in today's sociopolitical issues such as migration, climate, virtual finance, and surveillance society. It goes beyond state-of-the-art analytic methods in the humanities, combining, for example, qualitative close-gaze (of critical visual analysis) and quantitative distant-reading (from computer-assisted data analysis/empirical research). A main session outcome is added value for the humanities with "a socio-political iconography of the present", and discussion of a new "way of seeing," of "thinking with pictures," and asking "what do complex images want?" in the Digital Age.

Therefore this session welcomed as well proposals for adequate research infrastructures following the Liverpool Declaration, which was signed by scholars and artists based at institutions all over the globe to develop systematic strategies to fulfill the task that digital culture and its research demands in the 21st Century.

In the last few years, there was a significant increase of festivals and conferences dedicated to new media art, though the dominant festivals in the field continue to be the Ars Electronica, the Transmediale, the ISEA (Inter-Society for the Electronic Arts), and SIGGRAPH (Special Interest Group on Graphics and Interactive Techniques). To this day, museums and research facilities specializing in New Media Art are the exceptions. Nevertheless, ZKM (Zentrum für Kunst und Medientechnologie) or specific focuses in collections (including the Whitney Museum, the New York Museum of Modern Art, or the Walker Art Center) serve as important spaces for exchange. Beyond museums that reach a wider audience, there are smaller and smaller museums and galleries that focus on new media art (such as the Berlin-based DAM – Digital Art Museum). Additionally, archives in which are exhibited artifacts situated at the intersection of the histories of media, art, and technology, are important resources, including collections such as that

of Werner Nekes or those cabinets of wonder and curiosity incorporated in art history museums.

Even given this increase in festivals, however, a variety of significant research initiatives have been discontinued. These include the Ludwig Boltzmann Institute for Media.Art.Research, the Daniel Langlois Foundation for Art, Science and Technology, and Media Art Net. This difficulty in establishing sustainable funding structures, as well as support for access to shared data for the scientific research of new media art was made public and addressed by the Liverpool Declaration. Scholars and artists based at institutions all over the globe signed the declaration in a call to develop systematic strategies to fulfill the task that digital culture and its research demands in the 21st Century. Already in the late 1990s, it became clear, that media art research is spread over many disciplines and the need became urgent to give it common ground: Therefore, from 2002 onwards at Oliver Grau and Wendy Coones at Humboldt University Berlin, in Cooperation with Roger Malina, Leonardo and Sara Diamond, Banff Center developed the International Conference Series on the Histories of MediaArt, Science and Technology, which was started in 2005 through a collective process, involving more than 10 disciplines related to media art. The world conference series attempts to foster the exchange between these different disciplines and their various actors. To date, the conference has taken place six times with Re-fresh (Banff 2005), Re-place (Berlin 2007), Re-live (Melbourne 2009), Re-wire (Liverpool 2011), Re-new (Riga 2013), Re-create (Montreal 2015), Vienna/Krems (2017), Aalborg (2019). Documentation of the meanwhile more than 2000 papers and applications can be found on MediaArtHistory.org.[16]

This CIHA session focuses on an evaluation of the status of the meta-discipline MediaArtHistories today. Immersed in both contemporary and historiographical aspects of the digital world, we explore the most immediate socio-cultural questions of our time: from migration and media (r)evolutions, to climate, virtualization of finance and surveillance. And we do so through a fractal lens of inter- and trans-disciplinarity, bridging art history, media studies, neuroscience, psychology, sociology, and beyond.

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Phototaxydermy: Deduction of Species by Digital Neural Networks

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ABSTRACT

As the ongoing Sixth Extinction threatens all life on Earth, the role of image archives, including those from art history, becomes increasingly important for our understanding of species once inhabiting it. With 150 species disappearing every day, many of which still are unknown to us, photographs play an important role in expanding our understanding of life on Earth. Although taxonomists warn that photographs are insufficient for properly naming newly found species because they can be reworked, they are often all we have.

This article investigates how precisely reworking photographs by a photomontage technique, promoted by Charles Darwin and implemented by his cousin Sir Francis Galton, is now today developed and used to aid information retrieval and possible biological restoration of species. Media artists programming neural networks can now cast knowledge of species and interspecies by combining findings from computational photography and biological computing (A-life). In addition, complex images (Grau 2020) store biological information together with a visual cast. A new model works on the deduction from scientific premises computed by artificial intelligence rather than on the induction-based model of step-by-step naming.

KEYWORDS

Complex Images; Genetics; Generative Photography; Photogenetics; Species

Introduction

Humans have been interested in biological life apart of its own specie since ever; images of animals made in the beginning of visual culture prove it. However, only in the 16th century, following the development of taxidermy (Poliquin 2012), the first systematization of biodiversity was made possible (Davidson, 2017). Such systematization, used until today, is due to Carl Linnaeus' *Systema Naturae* (1735). The invention of the photographic process advanced it, by documenting step-by-step inductive methods.

Photographs today play a vital role in our understanding of species. We would never know how some animals looked alike if it was not for photography. Dodos, Honshu wolves, ivory-billed woodpeckers, huias, passenger pigeons, thylacines, and grey whales are examples of this. Unfortunately, we do not have images of all the species humans have seen. Some became extinct before the invention of photography, while others are yet to be registered, and many more continue to disappear without being named or photographed.

William Henry Fox Talbot – one of photography's inventors – created the first contact prints of a variety of specimens. He applyed a method extensively explored by his close friend Anna Atkins, who used light-sensitive salts on paper to create cyanotypes, direct cameraless image prints for cataloging British algae and foreign fauna (Saska 2010). In the following years, photography was implemented in biology as a standard tool. Biological photography has been storing the indexical version of phenotypes since the 19th century. Charles Darwin, whose *Origin of Species* (1859) contributed significantly to animal documentation, was also the author of one of the first photographic illustrated books ever published (Prodger 2009). In his book *Expressions of Emotions in Man and Animals* (1872), he commissioned images by dozens of photographers, including Oscar Gustave Rejlander (known for his use of photomontage) and Duchenne de Boulogne (later known for his experiments with facial muscles).

Wildlife images further developed with the popularization of the wildlife genre recorded by professional photographers and published in

specialized magazines (*National Geographic,* since 1888, and *Nature,* publishing photographs since 1890). Soon after, animal photography was practiced as a form of hunting, resulting in a new type of trophy; a *photo-trophy*. Yet, as our growing awareness of the harm caused to other species, this practice is gradually disappearing.

Today, camera traps set in the wild document animals in nature without disturbing them. In addition to animal photography, authors such as J. J. Woodward, Steve Miller, Katherine Wolkoff, and Todd R Forsgren, Susan Derges, or Sanna Kanisto and Isa Leshko, have been documenting the last members of species, known as 'endlings'; as seen in Tim Flach's series *Endangered Species* or in Joel Sartore's book, *Photo Ark*.

Endlings, or the 'rarest of the rare' (Ackerman 1997) die into the images.[1] Some design projects also present a 'requiem for a species' (Hamilton 2015). Award-winning campaigns – such as *Population by Pixel*, created in 2008 by Hakuhodo C & C&D for the World Wide Fund for Nature Japan – compared the number of species to the number of pixels, taking a more abstract approach. JJSmooth44 did another exciting project that visualizes animals in pixels and directly addresses the remaining members.[2] They all refer to the image archive as a specie in and of itself.

Since the Enlightenment, we have documented over 1.8 million out of an estimated 9 million species in various archives and databases. *Biodiversity Heritage Library* is the world's largest digitalized database, with images dating back to the 15th century. *Arkive.org, The Barcode of life, Catalogue of Life, Encyclopaedia of Life, Global biodiversity facility*, and the *Consortium for Conservation of Nature* are well known. However, as the Sixth Extinction (Kolbert 2015) continues at a rate of approximately 150 animal species per day, new types of archives are monitoring this tragic process. The *Red List of Extinct Species* is an example of this.

In addition to these visual databases are biological databases, DNA banks known as genomics databases, disease genome databases, or DNA elements. Some of them are dedicated to sorting species. *IOBL.org* (International Barcode of Life) projects generate unique DNA barcodes for 500 000 species. Finally, there are small-scale projects that include both types

of material; visual or photographic and biological. *Virtual Arboretum* by UCF, for example, combines complex information.[3] Such databases, Thacker claims, "redefine the notion of biological 'life itself'" (Thacker 2005).

In addition to these well-structured and organized databases, new ones appear online. Hese distinguishes two of them when writing that;

> Global biodiversity databases [...] emerge from the conjunction of two tendencies, an encyclopaedic, centripetal impulse that reaches back to the Enlightenment and seeks to in-ventory the entire known world, and the hyperlinked, centrifugal architecture of the Internet, which seeks to approximate a representation of this world through constant movement between data sites (Heise 2016, 65).

As the extinction progresses at a larger speed than the inventorisation of the information, we are relying on data that appears elsewhere, including social networks that introduce photographs of species previously unknown to scientists (Suprayitno et al 2017). They challenge the idea that a dead holotype should be abandoned, and a more speculative model of taxidermy could be employed (Aloi 2018).[4]

Photographs and taxonomy of species

Since 2013, there have been attempts to introduce recognition of new species through photographs (Pelser and Barcelona 2013) for one of the most apparent reasons – promoting taxonomy without dead bodies in the times of the Sixth Extinction (Marshall and Evenhuis 2015). Authors like Thorpe claimed that photographs may be 'better than a poor specimen' (Thorpe 2017, 449). This was the case for many historical examples that preceded the debate overviewed by Krell and Marshall (2017). In cases where only parts of specimens were preserved, or in cases where specimens have been lost, photographs, but also sometimes drawings were the only information of species. This has led authors such as Garraffoni and Freitas to propose a modification to the *International Code of Zoological Nomenclature (1999),* aiming to recognize new species that had not allowed photographs as the primary material, but the only material deposited. The Code, being an

academic standard in taxonomy, says that the author 'should designate as holotype a specimen actually studied by him or her, not a specimen known to the author only from descriptions or illustrations in the literature' (ICZN 1999, Recommend 73B). In addition, the Code anticipates that new species can be introduced through the full animal or parts of the animal, fossilized remains, colonies, or microscopic slides with new organisms.

Despite the growing role of photography in the recognition of species and the introduction of new ones, hundreds of taxonomy scholars and curators objected to photography-based taxonomy (Marshall and Evenhuis 2015; Ceriaco et al. 2016; Faundez 2017; Thorpe 2017; Rogers et al 2017, Zhang 2017).

In addition to the argument that photographs do not provide sufficient information for distinguishing between species, some authors warned that images could be reworked, or altered in many ways; for example, by photomontage. They asked for some additional conditions, especially for digital photographs, such as delivering images in RAW format (Aguiar et al 2017). Indeed, the reworking of photographs showing biological material is frequent, but it was also made under the framework of the very discipline of biology and, more precisely, genetics. In this chapter, I will overview some of the most recent practices, showing how image computation advanced in the biological model-creation and possible replication.

Deduction from images

One of the arguments of taxonomists for not acknowledging photography as a primary source for naming species was that images could have been reworked. Indeed, photographic images today can be reworked, and they could have been done since the beginning of photographic history. Fascinating enough, this has been mostly practiced under the framework of biological photography.

It was Darwin's cousin, Sir Francis Galton, established the field of genetic photography, or complex calculations in visual images that led to scientific knowledge of photomontage. Galton manipulated many

photographic images to create generic photographic hybrids demonstrating how individual phenotypes belong to a specific group, such as race, gender, or social layer, deducing new knowledge from visual data. On the one hand, Galton's research was responsible for the birth of eugenics, while on the other, it paved the way for the development of generative photography.[5] Galton's use of permutations of portraits to approach the field of genetics, later explored by artists Lewis Hine, Nancy Burson, Lilian Schwartz, and David Trood. They have demonstrated that the photographic permutation of types can lead to more diverse scientific knowledge.

In his 1986 book *The Blind Watchmaker*, Richard Dawkins was the first to describe a program that could create new generations of artificial life in support of the Darwinian theory. It referred to one of Darwin's predecessors, William Paley, who introduced an argument from design for the inclusion of God in evolutionary theory in his book, *Natural Design* (1802). Paley proposed an agent, known as an 'intelligent watchmaker', who monitored natural selection, which Darwin partially supported. Dawkins went on to save Darwin's evolutionary premises from devolving into theology by demonstrating how complex systems can operate through randomness without a supervisor. He introduced the *Biomorph Land* program based on the Darwinian model of natural selection. Several evolutionary art (EvoArt) or artificial life (A-life) authors, such as Tatsuo Unemi and Peter Kleiweig, used and expanded the program (Whitelaw 2004; Romero and Machado 2007). Initially, they processed programming lines as textual inputs matching the genome textualization, and which worked as an illustration of the process.

Today, processors are fast enough to use a large number of photographs — millions of them — to deduce the most complex information on species, based on scientific knowledge. While using photographic archives of species as datasets, the algorithm 'breeds' many new variants out of the imputed set. For example, Anna Ridler's *Myriad* (2018) computed thousands of tulips, while Jake Elwes computed new birds (2019).[6] Not only variants of animals and plants are computed. Human faces are also used in computations, as in Mike Tyka's *Portraits of Imaginary People* (2017), *Flick Kai* (2018) by Daniel Heiss, who entered 50 000 visitors into a photobooth to

generate new faces, and Philip Wang's *This Person Does Not Exist* (2019) or *GANimals* by MIT.[7]

Complex deduction

In addition to being used for artificial breeding, digital photographs — made of bits — have recently been enhanced with information that has become more significant than the image itself. This was noted by Sean Cubitt's chapter of reader *Scale* (2020).[8] In addition to technical information, images can also carry multiple and complex biological data.

Projects that would include complex data behind what is visible have also been developed for some time. One of the most known is *The Visible Human Project,* initiated in 1986 by the National Library of Medicine. The project shows all possible data on male and female bodies. Here, two cadavers — a middle age prisoner and a lady in her late 50s — are completely scanned by CT, MRI, Cryosection images, anatomic images, in order to provide the fullest and most compressed information on the human body. Today such projects can also be used for complex computation. For example, *Interspecifics* by Codex Virtualis — presented at last Ars Electronica (2021) — calculates hybrid bacteria produced between morphotype and genotype. Computations also involve human faces. Authors like Heather Dewey Hagborg, working on famous whistleblower Chelsea E. Manning, speak on possible faces from DNA algorithms.

In addition to visualization, genetic programming also evolved. It has been a while since Margaret Boden wrote that; 'AI is helping biologists to develop evolutionary theory in general' (Boden 2016, 121). More precisely, artificial intelligence helps us to understand the self-organization principle in biology, phylogenetic evolution, embryogenesis and metamorphosis, brain development and cell formation (ibid. 121).

Today genetic algorithm (GA) is often inbuilt into a digital neural network trained in one of the most complex data mining tasks: DNA mining and editing. For example, CRISPR/Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats) is one of these networks used to edit DNA by sequencing it in two parts. The Cas9 enzyme acts as DNA scissors and guides

RNA. By this, we are coming closer to autonomous genetic programming, which lies in the basis of the eugenics advocated by Galton, and it is influenced by the global capital (Thacker 2005).

Conclusion

To access databases of life and images of life, as well as to compute them, raises the question of whether biological types can be analyzed from computation (and thus the deduction of the model). It also raises the question of whether the initial inductive method of capturing and creating images is becoming increasingly restricted. We have reached a point where we can calculate species that existed on the planet without endangering or harming life on the planet.

In order to learn about the life that once existed on Earth, we will need to consult existing archives and databases of photographs and other visual material, as opposed to capturing and documenting species. By using digital neural networks, it would be possible to reconstruct missing pieces of the biological landscape that may have already disappeared. In this sense, the role of a new art historian would be to identify and point out species representations that can be analyzed by experts in the field, as well as to collaborate more closely with artists and programmers who may use information from both art and science to reconstruct digital biological diversity.

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8. The information concealed behind these digitized images is intricate. They contain EXIF data about the camera model and settings, as well as information about ownership and

copyright. Additionally, GIS data on the location of the recording is included. Reworked images may retain information about all manipulations performed on them, particularly if they are saved with layers. Additionally, they store their names and locations in databases. Finally, they are uploaded online and are tagged with their respective tags. All of this information is available to non-technical users.

Accelerated Displacements Between Systems: Positive and Negative Entropy as Climate and Aesthetic Issues In Post-Digital Media Art

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ABSTRACT

The accelerated dissemination of technological infrastructure is an intrinsic subject of discussion concerning media arts. Since modernism, critics and curators have chosen different perspectives regarding art's involvement with transient media generations. Post-digital aesthetics opens a new path in which media archaeology may be adopted for tactical purposes of resistance against planned obsolescence and climate crisis impacts. In this approach, objects and concepts become makeshift tools for sustaining migrations between natural, psychic and social systems. However, how can we deal with the afterlife of images, substances, and ideas that reverberate due to and in spite of the mnemonic devices' instabilities and their material collapses? How can we conceive a balance between negative and positive entropy?

This paper will address these questions by resorting to critical examinations of artworks and theories. Pieces by artists like Rafael Lozano-Hemmer, Christa Sommerer & Laurent Mignonneau, and Paul DeMarinis will be commented on to highlight some views towards notions of high and low tech. In turn, we will elaborate on contributions from authors such as Vilém Flusser, Bernard Stiegler, and Jussi Parikka. Mainly, we will focus on how these artworks and theories may refer to critical aspects concerning relationships involving nature, politics, climate, finance, biology, and technology.

KEYWORDS

Post-digital; Aesthetics; Entropy; Art System; Neganthropocene.

Media arts and medianatures

The accelerated expansion and dissemination of technological infrastructure is an intrinsic subject regarding media art aesthetics embodied in their critical and curatorial frameworks. Due to its increasing pervasiveness, modern technologies have given rise to various means through which different artistic achievements have thrived. Sound machines, chemical and electronic photography, telematic texts and graphics, light projections, automated devices, and the more recent cybernetic systems for magnetic recording, processing and transmission of multimodal signals – these are only a few cumulative yet dynamic, and more and more fast-evolving strains of a *media ecology,* with which art has a long and productive relationship.

Paraphrasing Kantian aesthetics, this media ecology becomes the very condition of possibility of anything to be made and considered both as media and as art – or media artworks for short. We can even go further: "What we refer to as our world is no longer thinkable without the medial", as Siegfried Zielinski[1] claims. With its multiplicity and vast scope, media ecology allows us to set up unusual and differing relations with space and time, providing both the ambiance (or climate) and the peculiar aesthetic issues critically addressed in media art projects. In this sense, contexts and contents turn out to be mutually constitutive. That seems to be one unavoidable aspect concerning problems about how we can place media arts in the whole art system. This placement might displace preconceived ideas, previously collected artifacts, and connected subjectivities – resulting from individual authorship, collaborations, cultural appraisal, and public attachment.

There are displacements between what Ludwig von Bertalanffy[2] calls artificial and epistemological systems. They involve practices and theories of arts, music, literature and design, as well as technology, economics, politics, and philosophy. However, technological pervasiveness has a much broader and more profound impact on the living environment, affecting habitats, dwelling conditions, and the consumption of energy and material resources. Consequently, we experience an accelerating displacement between artificial, epistemological and natural systems, resulting in problematic consequences.

The current technological dissemination speed rate has affected geological, biological and psychic systems. As a result, collateral damages and adverse effects abound, enhancing what Rudolf Arheim[3] called the catabolic destruction tendencies, already present in nature but accelerated by human action. This effect happens parallel to the hyper-exploitation of the anabolic shape-building principle, accounting for atomic and molecular arrangements behind matter crystallization, but excelled in life and consciousness emergence and their technological (media) exteriorizations[4].

In the critical framework related to the Anthropocene, Eduardo Viveiros de Castro and Deborah Danowski[5] warn us that we are facing "[...] an experience of the decomposition of time (the end) and space (the world), and the surprising downgrade of these two a priori conditions of sensibility to the status of forms conditioned by human action". However, according to Viveiros de Castro and Danowski, a setback must be noted:

> The transformation of humans into a geological force, that is, into an "objective" phenomenon or "natural" object, is paid back with the intrusion of Gaia in the human world, giving the Earth System the menacing form of a historical subject, a political agent, a moral person. In an ironic and deadly (because recursively contradictory) inversion of the relation between figure and ground, the ambiented becomes the ambient (or "ambienting"), and the converse is equally the case.

The deep temporalities involved in these exchanges and problems also point us to what Jussi Parikka[6] calls medianatures. As Parikka writes, this concept "[...] crystallizes the 'double bind' of media and nature as co-constituting spheres, where the ties are intensively connected in material nonhuman realities as much as in relations of power, economy, and work". Thereby, medianatures represent a geological and media-oriented variation of the concept of naturecultures found in Donna Haraway. Still following Parikka[7], we read that:

> [...] technological culture and its specific instance in machines are not just in time but also fabricate time. The revolution speeds of hard drives, clock times of computers, network pings, and so forth are examples of the temporalities in which machines themselves are embedded and which they impose on the human social world.

Neganthropocene and postdigital art system

Based on Niklas Luhmann's systems theory, Francis Halsall[8] claims that arts compose a complex, open and dynamic system, with its own isomorphisms and intercommunicating operations with other systems. Therefore, arts can be understood as part of our current medianature system, especially when emphasizing and resulting from relations between ecology and technology. Orders and structures emerge from the connections between the broad physical and cultural environment. In this process, culture is supposed to present comparatively less entropy than nature because it can make things through negative entropy[9]. For this comparison, we must emphasize how entropy was initially defined in thermodynamics: the tendency for all matter and energy in the universe to evolve towards a state of inert uniformity – where differences lose their power to make more difference and reproduce themselves anew.

Following this perspective, there is a prevailing negative entropic vector regarding art and cultural information, which means the reduction of data disorder for the benefit of structure. Such a process needs matter and energy for its conservation. On the other hand, there is a prevailing positive entropic vector concerning the matter in the long term – the degradation of its order and structure towards equilibrium states, implying the suppression of information and even life-cycle reproduction[10]. As Vilém Flusser[11] has written, "[...] information is the mirror image of entropy, the reverse of the tendency of all objects (the objective world as a whole) to decay into more and more probable situations and finally into a formless, extremely probable situation".

Therefore, we can formulate a question around entropy: how far can we disturb natural materials' structures and exhaust world energy resources, whereas we are driven (by concurrent biological, psychic or economic impulses) to build up an increasingly complex and derivative nature? Following Bernard Stiegler[12],

> Technics is an accentuation of negentropy, since it brings increased differentiation. But it is equally true that technics is an acceleration of entropy, not just because it is a process of combustion and of the dissipation of energy, but because industrial standardization seems to be leading the contemporary Anthropocene to the possibility of the destruction of life qua the burgeoning and proliferation of difference – a destruction of biodiversity, cultural diversity and the singularity of both psychic individuations and collective individuations.

For Stiegler, anthropocentric processes of negative entropy must be appropriately considered so that we avoid the end of the habitable world under the impulse of the destructive effects of the Anthropocene, also understood as a capitalist Enthropocene. Therefore, Stiegler proposes a careful epoch of the Neganthropocene, in which a new economic system would require "[...] a shift from anthropology to neganthropology"[13], in order for us to pursue value accumulation "[...] with a view to neganthropic investments".

We may now think about the displacing effects the Neganthropocene could bring to the post-digital art system, regarding its connection with political, economic, and even natural systems. What would be the consequences of this shifting environmental and perceptual problem? Assuming we are increasingly dealing with circumstantial but disseminated repairs that generate an afterlife of images and ideas that reverberate despite devices' collapses and instabilities, could we conceive a balance between negative and positive entropy through artistic approaches capable of critically connecting the complex territories of information, biosphere and the all-encompassing ecosphere?

Entropy has always affected traditional art media, although the decaying effects would usually be perceived after a long term, of decades or centuries. In its turn, technological art media has an inherent changeability over a much shorter time, of years or even months. In this sense, Hanna Hölling states that the former might be defined as "slow art." In contrast, the latter might be described as "fast art," whose dynamics imply variants and versions responsive to the rapid obsolescence and transitions of technical artifacts[14].

Different approaches have been chosen regarding arts involvement with transient technological media generations and their respective critical interpretation. Stephen Wilson[15] suggests three interweaving historical trends. Firstly, modernist assimilations and analogies are peculiarly more indifferent to comparisons between traditional and advanced devices, based on hitherto still prevalent convictions about the complete autonomy of the arts. We may also observe culturally contextualized analysis, built around the appropriation and deconstruction of technology operations, biases and their enframing discourses. Finally, there are constructive and speculative explorations when art projects engage with near or far-future technological unfoldings.

Post-digital art traces new paths in which archeological and speculative explorations around media and its aesthetics may be adopted for tactical purposes of resistance against accelerated and destructive entropy. Therefore, objects and concepts become makeshift tools for sustaining heterotopias and anachronistic migrations between the natural, psychic, and social systems. Following, we comment on a few representative examples.

Mexican-Canadian artist Rafael Lozano-Hemmer[16] pursues possible integrative relationships among various systems in his artworks, mainly involving the environment, architecture, sculpture, and human communication. One of his latest projects is Speaking Willow (2020), a sound installation consisting of one aluminum sculpture in the shape of a weeping willow tree. Data cables run through trunks and branches and emerge from their ends, hanging like willow leaves swaying in the wind. Covered with live vine and other climbing species, the sculpture has motion-activated speakers,

through which it murmurs sound files with poems, song snippets and sayings in hundreds of different languages. In this way, Lozano-Hemmer explores the willow tree's symbolic associations involving suffering, mourning and the hope for healing and belonging.

Fig. 1. Speaking Willow, 2020, Rafael Lozano-Hemmer. Presented at Planet Word, Washington D.C. Commissioned by Ann and Tom Friedman in partnership with Public Art Fund, NY. Photo: Les Talusan, courtesy of Planet Word.

The *Speaking Willow* also refers to material and immaterial affordances and constraints of public and global information and communication, supported by animate and inanimate actant networks, with their various entropic and negentropic levels and particular speeds. Other

works by Lozano-Hemmer have similar features. In *Call on Water* (2016) and *Cloud Display* (2019), semiotic contextuality and instability may be compared to weather conditions or climate change, with words forming and dissipating into water vapor. In *Weather Vanes* (2019), the blowing resulting from the audience's speech and breathing makes anemometers spin like gusts of winds. In its turn, *Linear Atmosphonia* (2019) is a complex and immersive soundscape installation, a tunnel featuring three thousand channels playing audio recordings of wind, water, fire, hundreds of insects and birds, bells, bombs, and other acoustic events. In *Babbage Nanopamphlets* (2015), the public inhales excerpts of a scientific treatise by English polymath Charles Babbage, printed on nanoscopic leaflets of gold released into the exhibition room's ventilation system.

Information and materiality are directly interwoven in the works of German artist and researcher Irene Posch, many of them developed along with Turkish artist and designer Ebru Kurbak[17]. Together they explore the fields of traditional craft and technological art media. In the *Embroidered Computer* (2018), the duo proposes building an 8-bit machine based on metal threads, magnetic, glass and metal beads. These elements function as relays, or signal switches, like those used before the obfuscation of computing black boxes after the invention of tiny semiconductor circuits and microchips. Users can interact with the piece, programming the textile to run computing tasks. In *Knitted Radio* (2014), the artists produce an FM transmitter by inserting conductive threads among the weft points of a wool blouse. The device is intended to facilitate communication in surveillance and political oppression contexts. His source of inspiration was the wave of protests in Turkey in 2013, a mobilization against the demolition of Taksim Gezi Park in Istanbul, which gained a crowd of supporters in the face of fierce police repression.

Social activism can also be articulated with environmental activism. In *HARVEST* (2017), New Zealander artist Julian Oliver[18] assembles a system in which windmills generate electricity to power a computer intended for mining cryptocurrencies. With the processing service provided for the maintenance and public verification of the ledger of encrypted transactions

(the blockchain), Oliver obtains financial rewards for funding non-governmental organizations engaged in climate change research and policies for its mitigation. This project reminds us of the medianature concept proposed by Jussi Parikka[19], relating data processing and ecology.

Relations between technology and biology are a common subject for media arts practices and aesthetics, as we may observe in the work of the Austrian and French artists Christa Sommerer & Laurent Mignonneau[20]. Years before we began discussions on the postdigital turn, Sommerer & Mignonneau created the installation *Interactive Plant Growing* (1992). The piece is a medianature interface involving live plants and virtual doubles visualized as image projections. Electronic transducers capture different voltages resulting from the audience touching the actual plants. The signals are then processed by mathematical rules based on biological evolution and development principles, affecting the virtual plants' growth in real time.

The artists' projects also explored relations among insects, their algorithmic doubles, humans, and the environment. For example, artificial ants produce interactive drawings in *ANTopolis* (2020-21) and Homo Insectus (2020). Artificial flies swarm, involving the public in an augmented reality installation in *Flies in the Sky,* 2017, or invading building façades in F*ly High Time Flies*, 2016, or *People on the Fly*, 2016. In addition, there are interactive animations, writing, and scribbling with non-specific virtual creatures in *Between the Lines* (2014) and *Life Writer* (2006).

Finally, we must mention the self-referential aspects of media archeology regarding technological devices in their material, operational and temporal qualities. One of the most known media archeologists is the Californian artist and researcher Paul DeMarinis[21]. In *The Messenger* (1998-2005), he invokes an alternative reading of the official history of electrical telegraphy and telematics, recovering forgotten origins, like the Catalan scientist Francesc Salvà's early proposals. The installation comprises three unusual systems for reading email words. First, a row of twenty-six metal wash basins turned into loudspeakers cast phonemes through reverberating voices. Next, twenty-six dancing skeletons shake themselves, dressed in ponchos stamped from A to Z. In another set, we find letter

shaped electrodes dipped into twenty-six jars with an electrolyte solution. The metal letters glow and fade, generating bubbles in the liquid as they receive the electric signals corresponding to the transmitted texts.

In its turn, the installation *The Edison Effect* (1989-1996) is a kind of imaginary media. In this project, DeMarinis juxtaposes mechanical and electronic acoustic systems. Vinyl or shellac discs, wax and clay cylinders, holographic discs, reels and dinner plates printed with soundtracks have their grooves and spectrograms scanned by laser beams, typically used in compact discs optical reading. The work combines assorted sounds such as military marches, classical and pop music, car crashes, and xylophone scales.

In Brazil, Sao Paulo-based artist Lucas Bambozzi[22] deals with communication ephemerality and planned obsolescence in many of his projects, such as *Short Circuit: Last Whisper (*2014), *Read Thing* (2014), or *From the Invisible Roof* (2013). *Das Coisas Quebradas* (Of Broken Things, 2012) is an autonomous and interactive contraption installation. The gears of a shredder machine for discarded cell phones accelerate as the flow of electromagnetic transmissions in the surrounding space increases. As the work suggests, the more intense the use of mobile media devices becomes, the faster the cycles of obsolescence will be. The artist presents the audience with a vicious cycle. The dissemination of wireless devices supports a growing telaesthesia. At the same time, this expansion demands the accelerated expansion of teletransmission infrastructures, which generates the increasing replacement and disposal of electronic products. This side effect raises questions: is a cell phone model more prone to entropic disintegration than the text messaging it sustains? Is the interaction between objects in science fiction now taking place as the internet of broken things, as Bambozzi proposes?

Final considerations

Technological art media points to a cultural and environmental mutuality. Along with their informative aesthetics, they bring about the occasion to reflect on the material and informational risks of hyper-industrialization. Some art projects commented on above warn us that its transience owes to

physical nature contingencies and technical circumstances. Entropy has always affected traditional art media, although their decaying effects would usually be perceived after a long term, in decades or centuries. On the other hand, technological art media has an inherent changeability over a much shorter time, of years or even weeks.

Despite this changeability, network and algorithmic machines were developed to conserve information. At the same time, they are part of a fossil-fuel economy that affects distant time and space, without touching them, due to the widespread and long-running climate change consequences. In this scenario, artworks turn out as playable objects and archives. Exploring them, artists usually speculate on new realities each time their works are shown and experienced by the public. Nevertheless, any artwork presents itself in or through a physical phenomenon. It persists only in a perishable condition, even when its materiality corresponds to its unique existence, especially when considering its artisanal making. Much more of this happens when its materiality is assumed as a transitional means of documentation and communication that can be updated or replaced, from conceptual art to contemporary media arts.

With our medianatures, curating and museological activities also have to counteract the entropy that threatens to disfigure what is selected as art. This approach requires special attention to the chaining of successive generations of mediation and remediation devices. This process started with the use of artwork photographs following the theoretical and critical proposals of Aby Warburg or André Malraux. Now, it is unfolding in the imagery obtained from scanning procedures and artificial intelligence. Regarding this kind of digital memory and production, the strategies of registration, documentation, circulation, and situated review become extremely important, as proposed by Hanna Hölling[23].

Common and uncommon sense unite for a kind of informational aesthetic paradox, affecting negentropy as a communicational foundation, according to Flusser[24]. The wide distribution, made possible by digital technologies, tends to undo the boundaries of the art system, to the point of almost nullifying the differentiation that sustains its systemic ordering.

Mediated by ubiquitous informational devices, life experience itself currently provides objects for aesthetic appreciation in an untimely and atopic setting. Although inclusive, telematic common sense does not result in entirely consensual meanings. Instead, the unusual becomes the binding element of attention. Through the cracks of informational disruption of the system, manifestations of dissent escape, threatening to scramble the sharing of codes of recognition of art. However, these manifestations simultaneously singularize certain spatialities and temporalities of drift that circumscribe the events to which creative values are attributed. Although the art system depends on institutional frameworks already given, other genealogies always emerge from their transient aspects.

Informational technoculture pushes us further and further into the vastness of data and the whirlwind of instantaneous transmission and processing rhythms. In this coded maze, several layers of algorithmic operations embrace sensory, cognitive, and behavioral aspects. Artists like the ones we commented on above have chosen a path of critical exploration, combining deconstructive and constructive biases, encompassing languages and materialities. Their works are transdisciplinary, archaeological, and speculative. They trigger an uncomfortable alert: against the inconsequential exteriorization of humanity, the Neganthropocene may be the only feasible and coherent way to postpone the end of the world.

Endnotes

1. Siegfried Zielinski, *Variations on Media Thinking* (Minneapolis: UMP, 2019).
2. Ludwig von Bertalanffy, *General System Theory: Foundations, Development, Applications* (New York: George Brazilier, 1969).
3. Rudolf Arnheim, *Entropy and Art: An Essay on Disorder and Order* (Berkeley: UCP, 1974), 27-28.
4. Bernard Stiegler, *The Neghantropocene* (London: Open Humanities Press, 2018), 57: "[...] technical life is an amplified and hyperbolic form of negentropy, that is, of an organization that is not just organic but organological, but which produces an entropy that is equally hyperbolic, and which, like living things, returns to it, but does so by accelerating the speed of the differentiations and indifferentiations in which this detour consists".
5. Déborah Danowski and Eduardo Batalha Viveiros de Castro, *The Ends of the World* (Malden: Polity, 2017), 2, 13-14.

6. Jussi Parikka, *A Geology of Media* (Minneapolis: University of Minnesota Press, 2015), 12: "Indeed, it is a regime constituted as much by the work of microorganisms, chemical components, minerals, and metals as by the work of underpaid laborers in mines or in high-tech entertainment device component production factories, or people in Pakistan and China sacrificing their health for scraps of leftover electronics."
7. Parikka, 7.
8. Francis Halsall, *Systems of Art: Art, History and Systems Theory* (Oxford: Peter Lang, 2008).
9. Ludwig von Bertalanffy, *General System Theory: Foundations, Development, Applications*, 42.
10. Edgar Morin, *The nature of nature* (New York: Peter Lang, 1992), 54: "all local regression of entropy (or negentropy) increases the entropy in the universe. Thus, we have here very exactly the reverse of the morphogenetic law whereby cosmic dispersion works, in one sense for organization. We see here that all organization works, in another sense, for dispersion."
11. Vilém Flusser, *Does Writing Have a Future?* (Minneapolis: UMP, 2011), 12.
12. Bernard Stiegler, *The Neghantropocene*, 41-42.
13. Bernard Stiegler, 45, 53-54.
14. Hanna Barbara Hölling. "The Archival Turn: Towards New Ways of Conceptualising Changeable Artworks" in *DATA DRIFT: Archiving Media and Data Art in the 21st Century*, ed. Rasa Smite, Raitis Smits, and Lev Manovich (Riga: RIXC and Liepaja's University Art Research Lab, 2015), 85.
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16. For multimedia documentation, see Rafael Lozano-Hemmer (artist website), accessed May 2022, https://www.lozano-hemmer.com/.
17. For multimedia documentation, see Irene Posch (artist website), accessed May 2022, http://www.ireneposch.net/; or Ebry Kurbak (artist website), accessed May 2022, https://ebrukurbak.net/
18. For multimedia documentation, see Julian Oliver (artist website), accessed May 2022, https://julianoliver.com/.
19. Parikka, *A Geology of Media*, 24.
20. For multimedia documentation, see Sommerer & Mignonneau (artists website), accessed May 2022, http://www.interface.ufg.ac.at/christa-laurent/.
21. For multimedia documentation, see Paul DeMarinis (artist website), accessed May 2022, https://pauldemarinis.org/
22. For multimedia documentation, see Lucas Bambozzi (artist website), accessed May 2022, http://www.lucasbambozzi.net/.
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Data Migration through the Bodies, Rocks, and Optical Fibers in Ayoung Kim's Speculative Fiction

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ABSTRACT

This paper discusses Korean artist Ayoung Kim's speculative fiction that intersects with data migration and refugee migration, complicating the relation between natural, human, and virtual borders in the age of planetary computation. Through the journey of the protagonist Petra Genetrix takes their through fictional and imaginary spaces and physical and virtual borders in her single channel video *Porosity Valley, Portable Holes* (2017), Ayoung's work engages us with as yet unexplored sociopolitical, ethical, and environmental dimension of data migration through the bodies, rocks, and optical fibers. Her work brings the phenomenon of data migration into our perception, by giving a data a tangible form and linking it with the sensory and affective textures of media infrastructure. Going further, Ayoung's *Porosity Valley 2: Tricksters' Plot* (2019)—revolving around the micro/macro histories and local and global socio-political issues—interrogates the ways in which Yemeni refugees in South Korea are treated and represented as a threat of virus or malware, thereby shedding light on the biopolitical control over both refugee migration and data migration.

KEYWORDS

Speculative Fiction; Abstract Body; Data Migration; Bit Rot; Borders

Our perception of the entity of data and its constant flow often remains unknown and imaginary, while our bodies and environments are entangled with their surrounding infrastructures, networks, and data flows. Data is often inaudible and invisible since it is a corollary of the velocity and quantity of data processing beyond the capacity of human perception and cognition. Also, the seemingly transparent media infrastructure is often subject to control by government agencies and major media firms. Then, how could we even make it possible our deep engagement with such unfathomable entity of data and its migration? As data migration has become part of the social, cultural, and technological conditions of our time, how do artists explore a speculative-sensible experience of our world and invoke cultural imagination, otherwise unacknowledged by or absent from our critical understanding? In this respect, Korean artist Ayoung Kim's speculative fiction, apparent in her video installations, sound installations, films, and performances and texts bring the phenomenon of data migration into our perception, by giving a data a tangible form and linking it with the sensory and affective textures of media infrastructure. Furthermore, through the journey of the protagonist Petra Genetrix, Kim's work intersects with the migration of data and of refugees, complicating the relation between natural, human, and virtual borders in the age of planetary computation.

Fig. 1. Ayoung Kim, *Porosity Valley, Portable Holes* (2017). Single Channel Video, Approx. 21 min. Video still. Courtesy the Artist.

In Ayoung Kim's single-channel video *Porosity Valley, Portable Hol*es (2017) Petra Genetrix's journey takes them through fictional and imaginary spaces and physical and virtual borders. Petra Genetrix is a virtual entity that can be variously defined as "unidentifiable blocks of mineral, shards of data, or a life form or intelligence from a world unknown to us."[1] Then, Petra Genetrix became a pseudo-mythical being, as people are awed by them abstract body composed of mineral living in a gigantic and bizarre-looking rock crystal in Porosity Valley and believe that Petra Genetrix has a power to purify their thoughts. However, such mythical power couldn't make any exception when they confronted practical problems in the migration process into another rocky platform. Like any new immigrant, Petra Genetrix is subject to an interview and 40 days of quarantine to prove that they are not carrying any viruses that may cause a danger in the new platform. Hence, Petra is subject to regal protocols and surveillance mechanisms of border control and the details of Petra's journey are saved in the "Immigration Data Center (IDC)."[2]

Fig. 2. Ayoung Kim, *Porosity Valley, Portable Holes* (2017). Single Channel Video, Approx. 21 min. Video still. Courtesy the Artist.

Taking speculative fiction as the methodology and art practice, Ayoung explores migration as multi-dimensional conception through the lens of Petra Genetrix's journey. As she states, the formation of her speculative fiction became possible under the influence from Reza Negarestani's work, especially, *Cyclonopedia: Complicity with Anonymous Materials*, and from Octavia Butler's Afrofuturism. Ayoung remarked that Negarestani's *Cyclonopedia*, a complex of "speculative fiction, theory fiction and horror fiction," was "like an invitation to a secret, chilly, forbidden territory, [which] was at the same time a criticism of the petropolitics of today." She added that Bulter's works "filled with stories about exile, diaspora, transport and transfer, and migrants and travelers who reached unexpected places," inspired her work on "multifaceted aspects of migration," that straddle physical migration and digital migration.[3]

The migration traversing such drastically different material strata as rock and data is inextricably contingent to Petra's virtual being as "half mineral composition and half data bits" and their abstract body. The evolution of Petra Genetrix is associated with Mithraism, an Indo-Iranian mystery cult dedicated to the worship of Mithras. The cult spread from ancient Persia into the Roman Empire between the first and fourth centuries before the ascendancy of Christianity. Intrigued by Mithra's status as a cultural and religious icon that successfully migrated from one powerful empire to another—from Persia to Rome, Ayoung's adoption of Mithra as the god of migration, settlement, and hybridization, therefore, has substantial meaning, while Petra is developed into Ayoung's own hyperbolic mythology. Also, Mithra as "'mother rock" or "God-bearing rocks," as visualized in the iconic image of Mithra emerging from a rock became an important reference for Ayoung's conception of Petra Genetrix. Then, Petra's abstracted body, like Mithra's, "embodies ambiguous gender, an ambiguity which amplifies their transcendental profundity."[4] That is, Like the bodies of most the Middle Eastern deities, they "transcends the established boundaries of gender as a divine being."[5]

Fig. 3. Ayoung Kim, *In Search of Petra Genetrix* (2020). A Live Voice-Transforming Lecture Performance, 30 min. Courtesy of the artist.

The migration of Petra Genetrix as "genderless, formless, and fluid nonsexual being," is supported by Legacy Russell's discussion of "digital diaspora" in *Glitch Feminism*. Relying on Edouard Glissant's definition of diaspora as "the passage from unity to multiplicity... when one consents not to be a single being and attempts to be many beings at the same time," Russell underscores that "Glitch feminism reapplies Glissant's 'consent not to be a single being,' making an appeal toward the cosmic range wherein a personal and collective dispersion toward vastness becomes a consensual abstraction."[6] That is, by elaborating our being as "continuous range of multitudinous selves" in post-digital age, Russell asserts that:

> This digital diaspora, therefore, is an important component of glitch, as it means that bodies in this era of visual culture have no single destination but rather take on a distributed nature, fluidly occupying many beings, many places, all at once."[7]

In this context, the notion of abstract body in Russell's glitch feminism is certainly indebted to Donna Haraway. Haraway takes the idea of the cyborg to explore a series of issues around the way gender, race, and class are framed in traditional "Western" science and politics and takes Cyborg as a rhetorical strategy and a political method. In this respect, her seminal piece, "*A Cyborg Manifesto"* (1985) calls for a new feminism that takes into account the changes that technology brings to our bodies, that rejects and transcends gender binaries, envisioning pluralism and indefiniteness with regards to bodies and gender.[8] Given that, Russell states, "[n]oun and verb alike, we use the body to give form to abstraction, to identify an amalgamated whole." Then, although "[w]e all begin in abstraction," the gendered body is constructed by social, political, and cultural discourses. In this respect, in glitch feminism, glitch as "a vehicle of refusal, a strategy of nonperformance," derived from technical glitch as failure or error of digital technology, "aims to make abstract again that which has been forced into an uncomfortable and ill-defined material: the body."[9] Following this line of thought, the abstract body in Ayoung's work intersects with cyborg, "'a creature of social reality as well as a creature of fiction' that prefigures a world transcending the oppressive binaries of modernity (male-female, culture-nature, subject-object, technology-biology, etc.)."[10] It is in that Petra Genetrix's body—that some may take as illusional or ambiguous—facilitates actualization of speculative being traversing different material substrates across time and space and operates as a device to intersect the realities and the imagination in Ayoung's speculative fiction.

In this respect, Reza Negarestani points out that the "portable hole" in Ayoung's work operates as "a gate mechanism toward the possible many worlds" or "gates towards the world of infinite possibility."[11] In his essay "Fragments on Cosmological Politics of Many Worlds," Negarestani elaborates that porosities or holes in Ayoung's work are "exactly what might be called epistemological technologies or tools for moving freely from one world to another."[12] Here, it is noteworthy that Ayoung's conception of porosity evolved from her previous voice performance and installation titled *Zepheth, Whale*

Oil from the Hanging Gardens to You, Shell (2014-2015). The project was based on her research into the relationship between petroleum, the expansion of the world economy and geopolitical conflicts. Her project calls attention to less known histories of the migration of Korean workers in the Middle East's petroleum industry, discussing the intersections between the microhistory of the Middle East and the modern history of Korea. From her research on the geological formations of petroleum, Ayoung was intrigued by the fact that when petroleum is extracted, its volume is artificially replaced with water. From there, Ayoung began to imagine and visualize "voids, pores and holes occurring deep underground," made through oil drilling for human usage.[13] To that end, such holes under Earth's surface led her to interrogate the relationship between "the Earth and the human race" mediated by the "miraculous substance" of petroleum.[14]

Fig. 4. Ayoung Kim (Music Composition: Heera Kim), *Zepheth, Whale Oil from the Hanging Gardens to You, Shell 3 (2015),* 6-Channel Sound Installation, 39 min 29 sec. Wall Diagram, Digital Print, 5x4m, Voice Performance, 20min. Courtesy the Artist.

By taking these enigmatic holes as the "dispositional entities" that gain their identities through the "interactions with other objects and worlds," Ayoung's speculative fiction, passing through "a constant transit through holes and interstices," connect "incommensurable worlds," while dealing with "this word, here and now."[15] That is, according Negarestani, we lack the "proper cognitive tools for moving from one world to another," although we are already within the reach of the universe of infinite connection and crossing of many possible worlds. In this respect, Ayoung's work showcases a "renewed mythos for a new logic of worlds that is necessary for the collective enterprise of migrating from this seemingly inevitable world to another."[16] To realize it, the multifaceted meaning of "portable holes" is instrumental in unfolding and interweaving narratives of migration "traversing and crossing the ocean" and "territory of data migration."[17] In this respect, Ayoung puts that:

> The occasional emergence of the "portable holes"—both the speculative and physical—let the stories, migrant/mineral and data particles penetrate through to encounter the unexpected things beyond.[18]

Thus, Petra Genetrix's journey entices the viewers to migration from one rocky platform to another, intersecting with digital migration through media storage and data centers. To realize it, Ayoung crosses the graphic rendering of the Porosity Valley based her research on Australia's distinctive geology and few of action scenes shot at the INA Data Center in France, in which the densely lined-up data storages forms a valley of towers.

Here, I underscore that data is constantly instantiated, materialized, and actualized through its migration from one data storage to another, traveling through infrastructure, which are often buried underneath the buildings in the urban media environment and underseas and thus invisible to us, reinforcing our conception of data as immaterial and ephemeral entity. In this respect, Ayoung points out that data migration come under our perception when data is only signaled by flickering light of the hardware equipment as bit-sized information-data traveling through fiber-optic cables.

Moreover, by redressing the ontology of data and its materiality, her work sheds light on the phenomenon of data decay and corruption that inevitably accompanies data migration. Ayoung's interrogation of "Bit Rot," a natural decaying process of data, demonstrates that data—which need to be reformatted, backup, and restored—only exists through the endless "migration" into a new storage media. Here, the seemingly transparent media infrastructure by which data is produced, disseminated, and rearticulated, involving data migration, however, is often subject to control by the multiple protocols and regulations of major media firms. Hence, Bit Rot makes us think of the life cycle of the tech-device, media storage, and infrastructure controlled by tech giants—that cause the inaccessibility to media file and data due to the planned obsolescence of software and hardware periodically updated by such companies, causing substantial environmental cost. Furthermore, the energy consumption for its operation and maintenance—for example, "its cooling system counterbalances the heat being constantly emitted from the hardware," has environmental impact not negligible. Given that such not-knowing or ignorance of the environmental cost of data migration attenuates "our ethical ability to dwell on interconnections between the present and future, between media and the Earth," Ayoung's work invites the viewer to speculate on the entanglement of natural, human, or virtual borders and data migration's material connection to ecological decline.[19]

Then, Ayoung's speculative fiction revolves around the micro/macro histories and local and global socio-political issues. Her multi-phase projects are underpinned by her long-term research that engages the "real-world issue" of border and migration. *Porosity Valley 2: Tricksters' Plot* (2019) comments on the recent Yemeni refugee crisis in South Korea.

There was an arrival of Yemeni refugees in South Korea in 2018 through the city's visa-waiver program that originally aimed to attract more foreign tourists. Without informing themselves about the asylum seekers, many Koreans jumped to conclusions and protested the admission of refugees, and cited a number of recent high-profile crimes committed by Muslim refugees in Europe to justify their opposition to accepting Yemeni

asylum seekers. Islamophobia had already taken root in Korean society, spawning fear of Muslims refugees and Islamic terrorists alike. Under these circumstances, Ayoung's *Porosity Valley 2* interrogates the ways in which Yemeni refugees in South Korea are treated and represented as a threat of bad virus or malware detrimental to Korean society, where a distorted "pure blood mythology" is pervasive.

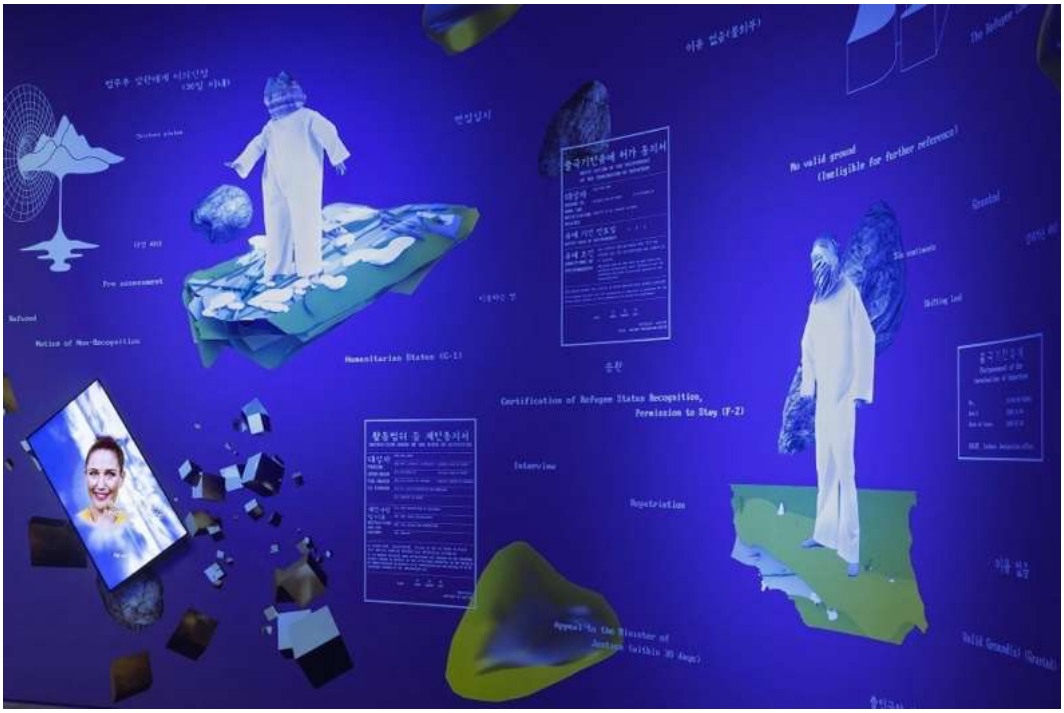

Fig. 5. Ayoung Kim, *Plot Diagram* (2019). Vynil Cut Sheet, Size Variable. Graphic Design: Soojin Lee and Ayoung Kim; Portrait Photography: Donghee Shin; 3D Objects Modeling: Atelier Pierre Pierre.

Shedding light on the biopolitical control over both refugee migration and data migration, the documents and graphic images redesigned from the actual government's legal document presenting complex immigration processes into South Korea displayed along with three nearly life-sized figures wearing masks, each of whom resembles stratum, tide, and stone. Such images illuminate the foreignness of Middle Eastern residents in South Korea, who "have been forced to exist in a liminal space," due to widespread Islamophobia and xenophobia. The abstracted faces, reminiscent of multiple

figures—aliens, non-humans, ghosts, or gods—visualizes, as Ayoung remarks, "the complex positionality of the migrants or humanitarian status holders who were recently displaced by the ongoing Yemen War."[20] In addition, the oral interview scene in the two-channel video stages the formality of the interview attempting to re-create for Petra Genetrix the pressure faced by the actual immigrants or aliens. That is, the interview interrogates the arbitrary conditions of Petra's validity as uncontaminated mineral/data, escalating the stress of immigrants involved in legal processes corroborated by the technological protocols. Petra, having failed the migration review, is incarcerated in alien detention center called "Smart Grid," or an alien detention center. Tracing this process, Ayoung undermines the notion of allegiance to the structure of authority and power implicit in the legal process that regulates belonging and security. In this way, *Porosity Valley 2* grounded in the factual information on the migration and its socio-political ramifications makes the viewer rethink life-threatening border crossing and refugee crisis—often relegated to the subliminal realm despite of its urgency.

Ayoung's method that posits and interrogates such problems crossing the factual and the imaginary within much-expended time and space scale might be at risk of abstracting the critical reality issues, however, such abstraction envisions the "possible world" grounded in her "reflecting and distorting the conditions of the current world," as Ayoung notes. As Ruha Benjamin asserts, fictions are "not falsehoods but refashionings through which analysts experiment with different scenarios, trajectories, and reversal" in that novel fictions "reimagine and rework all that is taken for granted about the current structure of the social world—alternatives to capitalism, racism, and patriarchy—are urgently needed."[21] Hence, Ayoung's work as a "refractive lens of perceiving reality," conjures, as Negarestani states, "a hypothetical or speculative world in which the possibilities are already actualized, yet for some reason we cannot bridge from our world to the countless possibilities."[22]

In conclusion, Ayoung's work—outside the dominant Anglophone contexts and thus under-exposure of scholarly attention—evinces a new confluence of interdisciplinary practices evolved at the intersection of art, speculative fiction, mythology, media infrastructure studies, and critical

gender studies. By paying special attention to today's human as a "data vehicle" in everlasting flux, movement, and migration, Ayoung's speculative fiction gives a form to a new mode of susceptibility that we urgently need to confront the physical environmental effects of data migration and the socio-political impact of refugee migration.

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A Forest.
Artificial Intelligence at Stake

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ABSTRACT

This essay questions the role of Artificial Intelligence in art images through the case of *A Forest* (2018), a two-part video and print exhibition project by Catalan artist Max de Esteban. Following Esteban´s late and soaring career in art, the text describes *A Forest* as a critical and self-reflexive high-tech piece with a paradoxical romantic and biologic aesthetic. Using a double performative logic, Esteban integrates artificial intelligence in *A Forest* both as a subject and construction process. Through the aesthetic and conceptual effect of both video and prints on the viewer, he seeks to uncover AI technology's hidden economic, political, and social implications. Rather than the technology of AI, venture capital drives the process.

KEYWORDS

Artificial Intelligence; Max de Esteban; Self-reflexivity; Neural Networks; Technology

What is an image in the Age of Artificial Intelligence? This paper will address a too-general and abstract question by reframing and "migrating" it to the disciplinary framework of Art History. Thus, the question will end up in terms that will inevitably echo Walter Benjamin's:

What is an image as a Work of Art in the Age of Artificial Intelligence?

From the start, the formulation of the question recognizes the pervasive use in the contemporary culture of Artificial Intelligence, referred to as "the new electricity" by Andrew Ng, co-founder of Coursera and founder of DeepLearning.[1] If AI yields behind hundreds of our ordinary daily gestures, why would the production, circulation, and reception of images not be affected by this high-end technological process? From the simple enhancement of photographs to the effective use of algorithms by Generative Adversarial Nets in 2014,[2] AI revolutionized our ways of generating and using image data on an expanded high-tech scale. So the concern here is not to assess the creative possibilities of AI as a valid art-making agent (which it can be)[3] or to judge the aesthetic worth of its products (which can happen).[4]

Instead, this text will center on the broader cultural implications of Artificial Intelligence as a meaningful art tool. As a thought-provoking example, This text will discuss *A Forest* (2018-2019), a work by Catalan artist Max de Esteban in its two parts.[5] The first is a 23-minute video installation, and the second is a set of 21 digital images. This piece is relevant to our question because it has circulated in the context of mainstream art, that is, institutional art related to high-end museums, galleries, and publications.[6]

While his first photographic project developed between 2010 and 2012 imposed a contemporary turn to studio portraiture by confronting the images with philosophical writings,[7] since then, all his work has focused on the overarching presence of technology in contemporary culture. Before *Infrastructures*, the project to which *A Forest* belongs, Esteban developed *Propositions*,[8] a five-series project that evoked different ways in which photography has been transformed by its migration to the digital:

> All the *Propositions* series have in common the effort to critically assess contemporaneity by exploring technology and photography's ability to renew its symbolic potency.

> Fighting for the renewal of photography's iconic force is to fight against the temporality of a capitalist economy that hyper-accelerated the info-sphere and, by doing so, eliminates our ability for critique.[9]

The first project of *Propositions*, *Only the Ephemeral*, dealt with the obsolescence of technical "bodies." The second one, *The Collection*, with textual semantics as power. The third one, *Touch Me Not*, with the complex landscape of occult nano-circuits that support the informational "real". The fourth one, *Heads Will Roll*, with the banality and overflow of image-bodies that eradicate the difference between subjects and objects, and the fifth one, *Binary Code,* with the relation between materiality and objects in an age of abstraction.

Fig. 1. Max de Esteban, *Propositions. Binary Code*. 6, 7 & 8 of a series of 24 images. 2015. Archival Pigment Prints on Cotton Rag Paper, 49" x 39".

Following *Propositions*, Max de Esteban started a long-term research and art project centered on what he calls the "infrastructures" of contemporaneity." [10] He defines *infrastructures* as "the key technologies, systems, and physical conditions that enable the circulation of meaning and power." [11] In the first project of Infrastructures called *Twenty Red Lights* (2018),[12] whose title is inspired by the lyrics *of Far Away Eyes*, a song by the Rolling Stones.[13] Esteban analyzed financial capitalism as the dominant abstract logic of allocating

real-world economic resources. In the second project, *A Forest* (2018),[14] he reflects on the ideological and practical implications of the progressive use of Artificial Intelligence in different aspects of our daily social life.

In both projects, the works of art result from an extensive dialogue and collaboration of Esteban with technical experts, financial executives, and theoretical thinkers: Blai Thomas, Jade de Robles, Arnaud Bayle, Franco "Bifo" Berardi, and Michel Feher in *Twenty Red Lights*, and Arnaud Bayle, Isabelle Hupont, Blai Thomas, W. J. T. Mitchell, two AI Chief Technology executives, as well as an anonymous classmate of Esteban at Stanford in *A Forest.*

Both projects of Infrastructures have a similar purpose of unveiling, in a Heideggerian sense, that which lies hidden beneath technology and that is related to its economic and ideologic instrumental use. In Twenty Red Lights, he highlights the concrete strategies of the neoliberal economy that produce surplus abstract value (and social inequality as a negative counterpart): a "faceless power" that operates as "the prelude to power without accountability."[15]

Fig. 2. Max de Esteban, Index of *Twenty Red Lights,* Madrid, La Fabrica, 2018.

Moreover, in *A Forest*, he calls the viewer's attention to the rhetoric of technical perfection and practical implications of artificial intelligence that repress the ideology of power, profit, and social control. In both projects, the use of text is fundamental. He writes the scripts for the video works from lengthy dialogues with his collaborators, in these cases, Feher, Berardi, and Mitchell, and several "investors" of large AI firms who preferred to be kept anonymous.[16]

Esteban's collaborative and transdisciplinary methodology is instructive in explaining his professional background, which is not that of a standard artist. After enrolling in simultaneous programs in Art and Engineering at a bachelor's level, he receives a master's degree from Stanford University and, afterward, a Ph.D. in Economics and Business from the University Ramon Llull in Barcelona. This academic background and the closeness of Esteban to the finance world, where he worked for almost three decades until 2010, constitute the core of his art projects. His professional art career, put on hold when he left for Stanford and retaken then, has since had a soaring success.

Described as "meta photography"[17]the work of Esteban is based on digital image reutilisation and manipulation rather than on their production from scratch. His process is rational and concrete, like that of an engineer. And knowledgeable and cunning, like that of an economist. Based on a flawless usage of digital image-making —digital photography, video, and artificial intelligence—, all his projects center on the interrogation of technology and economy in a broad sense:

> Technology is the key to understanding photography and, more importantly, understanding the world of the 21st century. If Art is to address the symbolic universe of its time today, technology has to be at its center. Photography's stress is equivalent to the anxieties resulting from an abstract economy driven by digitalization. Intangible economy is today the most decisive, one that ultimately influences the conditions of our existence.[18]

Esteban produces luscious and elegant images with a distinct aesthetic

quality through a directed and resourceful use of digital imaging software. Nevertheless, his images are much more than a formal exercise of style or technical knowledge. Produced after verbal statements, they acquire a political and ideological edge through reflexive linguistic operations. Even though they still refer to worldly things, their primary semantic strategy is critical. They seek to uncover the same critical process that informed their construction as technological interfaces: imaginary surfaces created by the mechanical and nonsensical capacity of random digital montage.

Recursion is fundamental to his method. Esteban repeats the same formal procedures in each group of images within a set. His mechanical process reminds us of the syntactic and semantical implications of technical reproduction in the images (Walter Benjamin),[19] as the psychological connotations of repetition (Sigmund Freud).[20] While single images may appeal to us, viewing them as a whole allows us to perceive the critical sense of the project as a whole. Its content resides in the texture produced by dispersed and heterogeneous elements that technical media weave together and request to be read through surface scanning. We might then speak of fields of meaning by which the textual propositions are imagined —that is, transformed into images— through the overlay of shapes and colors. Like Robert Rauschenberg's work made from image fragments, the images of Max de Esteban operate as a fabric of sensations. The conventional mimetic quality of photography collapses when used as transparent veils floating in Esteban's dream-like virtual spaces.[21]

Language is also fundamental to the art project of Max de Esteban. Propositional use of language is the substratum of several of his pieces. Its essence is the productive potential of codes, whether textual or imaginary, embodied in the image by the technical media at use. The semantic collision of image and language is fundamental to the ideological edge of his pieces, which is subtly hidden under their appealing formal syntax. Sometimes attached to the photographs on the side (in his publications) or underneath them (in the exhibition prints), the phrases, aphorisms, or quotations selected by Esteban serve as conceptual markers that help us establish their meaning.

Whether affirming, negating or disrupting the apparent sense of the

images, the textual arguments constantly collide in some way with them. This indetermination of meaning is fundamental to the critical operation of the works because it forces the viewer to confront her perplexity. She might question several issues when looking at the prints of *Twenty Red Lights*: *What am I looking at? Why the red dots? Or the texts? What does a quote by Milton Friedman published in* The New York Times Magazine *have to do with a photograph of an American city, probably New York?*

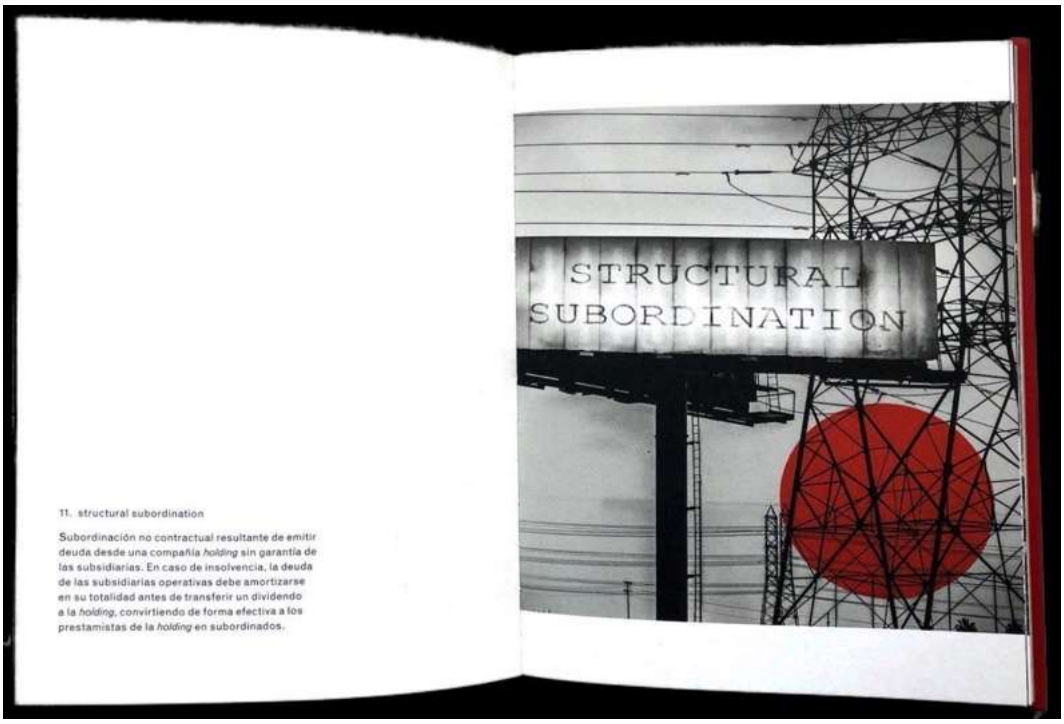


Fig. 3. Max de Esteban, "Structural Subordination", Bullet 11 of *Twenty Red Lights,* Madrid, La Fabrica, 2018.

By pairing the photo with Friedman's text on shareholders' value[22] and inserting a red dot in the image, Esteban signals to the viewer something hidden within it, the underlying economic mechanism described underneath in the quotation of Friedman's text:

> In a free-enterprise, private-property system, a corporate executive is an employee of the business owners. He has direct responsibility to his employers. That responsibility is

> to conduct business by their desires, which generally will be to make as much money as possible while conforming to the basic rules of society.[23]

Esteban achieves a blunt portrait of Friedman's neoliberal purported "free society" through a cold pairing of image and text. The irony of his project is best understood when linking it to the lyrics of *Far Away Eyes* song by the Rolling Stones that inspired the title of his series:

> Listening to gospel music on the colored radio station,
> and the preacher said, "You know you always have the Lord by your side",
> and I was so pleased to be informed of this that I ran twenty red lights in his honor.
> Thank you, Jesus, thank you, Lord.[24]

The above lyrics suggest a shared clue to the meaning of *Twenty Red Lights* and *A Forest*: the male figure of authority, the preacher in *Twenty Red Lights*, and the male voice of the video in *A Forest*, Esteban's following work on artificial intelligence. It is a 23-minute sequence shot of a walk through a dense and dark forest. The camera wanders through the trees, its way seemingly lost while the fog grows denser. The point-of-view shot enforces the subjective effect of identifying the camera's movement with the viewers, whose senses become abstracted — like the girl in *Far Away Eyes*— in the drifting walk in the woods. The viewer is not Benjamin's *flaneur*,[25] haunted by the illuminated products of the store windows. Here, the viewer is absorbed in dense discourse, symbolized by the dark forest. The voice-over speech orients both her thoughts and her wandering walk. Like the preacher's voice on the radio that makes the listener run twenty red lights, here, in *A Forest*, the omniscient narrator's male voice absorbs our attention.

Like the preacher's voice, this one is male and exerts authority over us. However, it is not a human voice, but one produced through AI. While most of the script was written by Esteban extracting and editing the transcript of his conversation with a renowned AI firm manager, he would not accept that Esteban recorded his voice. Instead, he suggested using the Beta version of an

artificial voice-generating program his company was testing. Esteban had to answer a questionnaire to set up the parameters for the voice's pitch and tone: that of a white Anglo-Saxon male in his fifties, fluid, secure, and sometimes emotional. Thus, what we hear —what guides our perception— is a coded message of authority, that of a preacher, a priest, a judge, or a teacher, like in Alessandro Baricco's description of the "old elites" of technology in his bestseller *The Game*.[26] Baricco starts his story by affirming that he will let us know "what has really happened". That is precisely the arrogant and self-serving tone of the voice in *A Forest*: one of the headmasters of the tech companies that monopolize the industry of communication like Facebook, Apple, or Amazon, the most profitable business nowadays (a male white and well-educated man, with a soft and assuring voice).

Fig. 4. Max de Esteban, Video stills from *A Forest*, 23 minutes, 2019.

The computer-generated voice instructs us our way to happiness with its subtle mechanical pitch, like the preacher of *Far Away Eyes*: "AI is there to solve whatever needs to be solved." However, times have changed. The fifty years that have elapsed from Friedman's article have indeed taught us something: that the "social interest" that he opposed has to be put back in the

picture. Out of a mere rule of economic efficiency,[27] business rhetoric needs to represent the "public interest" and pay attention to areas of public concern like safety and pollution: an analogous message to that of the manifest destiny, but where the Nation's well-being is exchanged for that of High Tech Human Life. As in the manifest destiny doctrine, well-being is painted in the image to repress the need for expansion.

The AI chief executive's discourse purports to represent the "people's interest" in the fashion of the "progressive neoliberalism" that Nancy Fraser has described:[28] that is, the unlikely alliance of the "most dynamic, high-end, "symbolic," and financial interests of the US economy (Wall Street, Silicon Valley, and Hollywood with arguments of social interest inherited from the New Deal. This democratic "repackaging" of the discourse of profit is needed for the neoliberal project's success. Only disguised as socially progressive can deeply regressive financial interests become a new hegemonic bloc.[29] Thus, masked as "social interest," the rhetoric of AI technology is also political, as the voice says:

> Vladimir Putin, he recently said that whoever became the leader in AI would become the ruler of the world. I think he is right. The recent achievements are mind-blowing, think about facial recognition. Up to very recently it was only available to top intelligence services, and now its fully integrated in our lives. Facial recognition technology is far more precise than human ability. We are just becoming to understand its immense power.[30]

That governments require intelligence services is something we are aware of. Nevertheless, as the voice informs us, the private counterpart of elite communication companies is already taking power over our off-line lives:

> What we do online and off-line is blurring. Last year, Google announced that it had garnered with "off-line parties" that give them access to 70% of all credit and debit card purchases. This allows them to link the adds online with consumer behavior off-line. FB does something similar. Through contracts with data brokers FB know

> about you off-line life, how much money you make, which restaurants you go to, how many credit cards you hold, and so on. And private homes will become a major source of information. Amazon Alexa, Microsoft Cortana, Google Assistant, Apple Siri. They all use speech recognition and upload all the recordings to the cloud. The more you use them, the better they work. Even if one tries to avoid the technology, its very difficult not to contribute to data accumulation.[31]

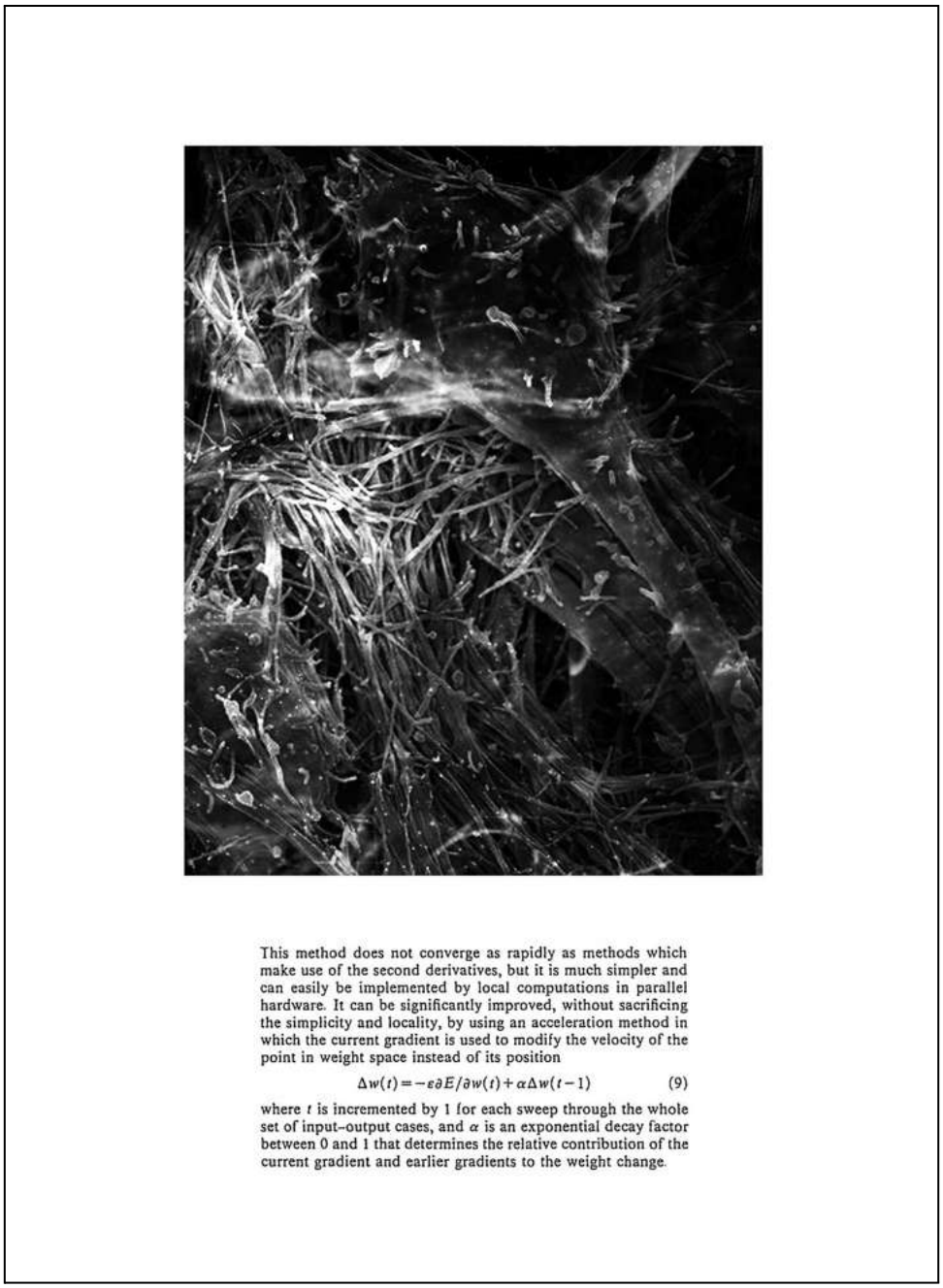
The issue is clear: the more data a neural network is fed, the better it works. Rather than the technology of AI, venture capital drives the process. Algorithms supersede human speed or calculus capacities when approving loans, selecting job candidates, predicting text, translating, making location-based suggestions, or making Art. While the process seems autonomous and rational, someone needs to feed the machine with specific data (weigh initialization) to set the parameters of decisions and objectives of neural network models.

> We invest in IA technologies that have the potential to change the world in which we live in. Revolutionize whole business sectors. Technologies that create a different future. Electricity, antibiotics, nuclear energy, well, Ai is greater, much greater than anything before. It will change the nature of our world, of humanity. It's a New World we are inventing. And its happening fast, incredibly fast.[32]

As expressed by the voice, AI's development is a central value of the post-industrial high-tech economy. Rather than through the exchange of objects proper of capitalism, value is created through exchanging information in a post-capitalist neoliberal economy. But are we sure how AI produces information? Are deep neural networks not black boxes? Can thinking machines, like neural networks, supersede humans at all? As in Twenty Red Lights, the answers are there for the viewer to answer.

In the second part of *A Forest*, a series of 20 computer-generated images, De Esteban puts the machine's creative capacities through a peculiar test. He asks a GAN multi-layer neural network to imagine (that is, to produce

a new image out of learned information) a self-representation of itself. In short, he asks for a selfie of herself.



This method does not converge as rapidly as methods which make use of the second derivatives, but it is much simpler and can easily be implemented by local computations in parallel hardware. It can be significantly improved, without sacrificing the simplicity and locality, by using an acceleration method in which the current gradient is used to modify the velocity of the point in weight space instead of its position

$$\Delta w(t) = -\varepsilon \partial E/\partial w(t) + \alpha \Delta w(t-1) \qquad (9)$$

where t is incremented by 1 for each sweep through the whole set of input–output cases, and α is an exponential decay factor between 0 and 1 that determines the relative contribution of the current gradient and earlier gradients to the weight change.

Fig. 5. Max de Esteban, *A Forest*, Print no. 18, 2019.

The results are surprising. Rather than a deformed human being (the information that the GAN had) or a diagram of circuits, the selfies of the machine resemble real physiological neural networks. The deep neural network chooses to portray itself as a biological organism. Esteban makes the exhibition prints attaching to each one a fragment of text from the highly cited paper of 1986 signed by Geoffrey Hinton, one of the "fathers" of Deep Learning.[33] Hinton's article proposes the back-propagation algorithm that allows artificial neural networks to "learn". That is achieved by creating useful new features through hidden processes (the adjustments of weight and bias of the inner layers of the neural network). Backpropagation as "learning" marks the start of autonomous intelligence brain-like machines that accomplish tasks like speed recognition and machine vision, such as other tasks praised by the voice in the video.

Like the video, the prints suggest a symbolic relation between biology and information. However, while the footage produces this semantic link kinesthetically, through the uncertain wandering of the camera, the print series does it graphically by stressing the differences between codes: the visual physiological code of the images against the abstract mathematical logic of the text.

Both the nervous system's diversifying branches and the forest's diverging paths stand as models of Western thought. For instance, the "tree structure" informs Aristotle's categories, scientific classification, taxonomy, and bibliographic classifications. It worked well as a model with explanatory or predictive capacities until Deleuze and Guattari introduced their alternative "rhizome" theory.[34] Due to its representation of a non-hierarchical structure, rhizomatic structures serve as better metaphors for information flow in networked environments like the hyperlinked internet of deep neural networks.

Therein lies the paradox —and the critical operation— of *A Forest*. While it centers on high-tech artificial intelligence, its aesthetic reference in the work of Esteban is romantic aesthetics. So while it points to the future, it is regressive in its aesthetic appearance. Esteban's forest is not a literal or scientific representation of a deep neural network but an aesthetic and

rhetorical one. It was created for the world of Art and is addressing it. It belongs to the realm of Aesthetics.

This is not a pipe. This is not a forest.

The artwork hides a pun. The filmed forest in Esteban's video is not natural, although it looks real. Formed by real trees, this artificial forest was transplanted from its natural ecosystem to its present location in California. It was commissioned by an elite business executive who wanted an artificial forest in his backyard and who let Esteban film it.

> *I want a forest. I make a forest.*
> *You want my selfie. I make an image of your brain.*
> *(Or of my brain, because my intelligent processes emulate yours).*

Artificial intelligence started a long time ago, and artwork construction is part of it. It has used mechanical, electronic, and biological means. As the voice informs us, it has attained significant achievements. Epistemological obscurity —the dense forest fog—has yielded in the machines' technical operation. Indeed, has had an exponential increase with deep neural networks whose processes remain hidden from us. And that is because they work too fast and achieve too much.

Esteban is not making technological art; he is making art out of technology. Machines can undoubtedly create images that can function as artworks. Still, humans make art out of their subjective volition, according to a social environment and within the constraints of the artificial art world. Even though *A Forest* uses AI in its construction, its value as art derives from its reflexive and performative operation as aesthetic language. On the one hand, at the basic syntactical level of technique, *A Forest* demonstrates that AI can make images and that those images can serve as art. And on the other hand, at the semantical level of discourse, it uses art to place an important question: *What is at stake with Artificial Intelligence?*

When placed in the aesthetic realm of art, the above interrogation is rhetorical. In the imaginary and open space of art, the viewer will find herself in the free play of her senses, using her imagination and her capacity to think allegorically. She will grasp whatever she finds in the artwork that reflects herself and her world. *A Forest* uncovers her in her world of meaning: she may end up caught by the simulacra created by artificial intelligence or may be amazed by its technical achievements. Or maybe she will unconsciously use AI's help in her daily life, as most people do. Finally, AI will tag her in the world of data as a pinpoint in a data map. As an image of herself.

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Ways of Seeing: Visitors Inside the Galleries from the Post-Photographic to the Musealized Museum

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ABSTRACT

This paper investigates the transformations brought to institutions with the popularization of cell phones in museums, making a comparative study about the visitors viewing habits before and after the photography was disseminated inside the galleries. Through the analyses of the visual content of museum spaces shared on Instagram, along with archival images before the digital era where people are depicted, it discusses some important changes in the construction of spectatorship. The large number of people sharing and tagging pictures taken inside museums is determining a new role of the audience not only in documenting but also in taxonomizing collections. This musealization of the museum through a cell phone is also discussed examining theories about attention concerning visual technologies. This new kind of individualization of vision is correlated with the formation of the modern viewer through a disciplinary process. Although the ubiquitous use of cell phones inside the galleries points to a new way of seeing, visitors also follow a cultural tradition on how to behave in the museum when depicting themselves. As such, repeating gestures found on social media are compared with pictures from other times, drawing attention to a socially constructed imaginary of spectatorship in museums that still prevails.

KEYWORDS

Museum Spaces; Visitors; Photography; Collaborative Archives; Instagram

Introduction

There are many ways of seeing and being in the museum. In *Old Masters* (1985), a novel by Thomas Bernhard (1931-1989), the main character goes every other day to Vienna's Kunsthistorisches Museum to look at a single painting. For more than thirty years, he has sat in front of Tintoretto's *Portrait of a White Bearded Man* (c.1570) on the same bench in the Bordone room that the watchman in charge makes sure is reserved for him. One can go to the museum to wait for hours to pass, like one of the characters in the movie *Museum Hours* (2012). The woman who travels to Vienna to see her sick cousin intersperses her trips to the hospital with visits also to the Kunsthistorisches Museum, where she ends up getting closer to one of the watchmen - for whom the hours spent there is nothing more than her working hours. Stories of people who arrange romantic meetings in museums are also common in fiction or even of unexpected love encounters.

Among the many possible reasons for visiting a museum, often far from the intention of seeing works of art, there is one in common: it is almost always an experience involving some social interaction. And this is perhaps one of the most striking changes brought about in recent years with the naturalization of photography in these spaces and the sharing of these images on networks, configuring another kind of sociability. Charlotte Klonk points out the social aspect as something particular to museums and what differs from other cultural experiences: "One rarely visits museums alone, and there has never been a rule in museums that says that one should only be silent in front of works of art."[1]

Although this idea of socialization was present in the origin of public institutions, where many times it wasn't even possible to visit except in groups and with a guide, images of people in these environments were later neglected as part of a material to be documented. While writing about the modernist art gallery space, Brian O'Doherty defined this phenomenon well when he said that “while eyes and minds are welcome, space-occupying bodies are not—or are tolerated only as kinesthetic mannequins for further study”[2]

There may not be a set rule about remaining silent in front of an artwork, but, just like this one, there is a series of rituals that we know very well how to reproduce: a certain position of the crossed arms close to the body, a movement of the head tilted to the side showing interest; the hand pointing to some painting denoting knowledge or authority. These are not rules that we read anywhere, but they seem to have been incorporated into the corporeal memory of visitors that cross generations.

In this paper, I discuss some recent transformations in the visitor's experience in the museum through its photographic representation. Analyzing the visual content shared on Instagram and archival images before the digital era in which visitors are depicted, it discusses the construction of spectatorship from the early times of museums to contemporary spaces. If the invention of photography in the 19th century caused a considerable transformation in art history in the era of the "post-photographic museums," influencing both the formation of new collections and the specialization of conservation departments, the spread of this new media has been encouraging an equally significant change.[3]

Most of these changes started to happen in recent years and are correlated with the launch of Instagram, in 2010. Since then, many museums began to review their restrictive policies on taking photos inside the galleries, encouraging visitors to photograph themselves and the artworks. The large number of people sharing photos in museums and marking them with hashtags is determining a new role of the audience in archiving collections. As Beryl Graham points out, “audiences are not only documenting but curating and taxonomizing.” [4] These participatory archives are available on social networks without hierarchical distinction, and are often more diverse than museum archives.

Methodology

The searches were made both in the institutions' archives and on Instagram, also including some photos taken by me during visits to museums. The frame in this social network focused on thematic hashtags, among them: #artwatchers_united; #girlinmuseums; #museumvisitors; and other

personal profiles, such as Stefan Draschan, who created the hashtag #peoplematchingartworks.

This ongoing research in museums took part initially in collections with vast material available online, especially the Metropolitan Museum of Art and the MoMA. Several institutions were contacted to make on-site visits, but many preferred to send a pre-edited selection, as was the case of the Whitney Museum of American Art, which justified not having an organization in the archives for these topics that would allow in-person research; or the documenta Institut. Such situation points to another point: how the archival methodologies that arise in the networks end up being more efficient than the institutions' categorization systems –which rarely present a method to store images from the public.[5]

Using a qualitative analysis and a curatorial approach in search of narratives, I developed three thematic axes: "Ways of seeing and controlling: from self-surveillance to self-representation"; "Ways of seeing and copying: mimesis and repetition"; "Ways of not-seeing: the performative gaze." Each is discussed both from a certain repetition of gestures and patterns in different periods and possible breaks with a socially constructed imaginary about the museum.

Ways of seeing and controlling:
From self-surveillance to self-representation

Two children look at Pablo Picasso's painting *Paul dressed as a Harlequin* (1924), while being stared at by a man who seems to be there to instruct them on how to behave. The two of them, in turn, involuntarily reproduce the position of the hands of the boy portrayed on the canvas. Nobody seems very comfortable in that situation, as if visiting the commemorative exhibition of Picasso's 75th birthday at MoMA was almost a sacrifice or social duty to be fulfilled.

The described photo could be a good illustration of the book *The Birth of the Museum* (1995), in which Tony Bennet classifies museums as "civilizing agents" of the emerging working classes, as well as women and children, by promoting self-surveillance as a first way to integrate into the modes of a new

civilized urban life. It is a rather didactic representation of what the author classifies as the "exhibitionist complex," an expression used in dialogue with Michel Foucault's concept of the "prison archipelago," defined as "a movement which simultaneously helped to form a new public and inscribe it in new relations of sight and vision."[6].

Fig 1. Unidentified visitors at the exhibition "Picasso: 75th Anniversary", 1957. The Museum of Modern Art, New York/online collection.

While in the emerging prison system one was monitored at all levels by a superior eye, in museums the intention was that disciplinarization be internalized until it was reproduced naturally. In these two "institutions of confinement" created at almost the same time, reprehension works in a complementary way: if the self-surveillance of the former is not sufficient, the offenders of civility are directed to the spectacle of punishment of the

latter. Or, in his words: “Where instruction and rhetoric failed punishment began.”[7]

To discipline the gaze and restrain the other senses, one had to be attentive – which did not happen spontaneously. In *Museum Bodies - The Politics and Practices of Visiting and Viewing* (2012), Helen Rees Leahy presents several accounts by visitors of what was called "museum fatigue," the result of measures to attract and hold the attention of a new audience that was being formed. Symptoms such as dizziness or even nausea appeared in these descriptions until the first half of the last century. One of these early studies, done by Benjamin Ives Gilman at the Boston Museum in 1918, even used a model in a photographic series staging the movements made by the body when following a normative practice of “good seeing”, as it was understood at the time.[8] Gilman also developed a portable apparatus called a skiascope, in which the visitor could isolate a particular work and diminish the interference of other external visual stimuli.

Behind ideas like these was the rise of a new culture of visuality since the early 19th century, which sought to isolate vision from the other senses, leaving the body as a secondary element – as Jonathan Crary discussed in *Suspensions of Perception* (2001). The title already announces an analysis that carries a contradiction in itself: the idea of "suspension" can be used both to define a state of full and immersive attention and an abrupt interruption of a focus that does not linger for long on anything. As will be demonstrated throughout the book, this is far from being unique to contemporary life: "Attention always contained within itself the conditions for its own disintegration; it was haunted by the possibility of its own excess – which we all know so well whenever we try to look at any one thing for too long.”[9]

The idea that neither state exists without the other, and that perception happens in the constant transition between attention and distraction, is adapted by Leahy when talking about the museum’s way of seeing as a combination of the *gaze* and the *glance*. The author argues that the dynamic shift between one state and the other – one of full attention and the other a distracted sideways looking – is what establishes the "choreography of bodies" in these spaces.[10]

It is precisely this alternation between the two states that is lacking in the photograph of Picasso's exhibition at MoMA, where the only way of seeing depicted is direct and artificial attention demanded by the indoctrinating gaze of the man. If the children's body posture follows a protocol of how to behave, their gaze contemplates the painting in a tense way, simulating attention that perhaps does not exist.

It is a very different scene from this other photo taken in 2020, where we also see a child and possibly her father looking at Vincent van Gogh's *The Starry Night* (1889), also at MoMA. Instead of a disciplining body position, the man bends down to view the work at the girl's eye level. Both seem to look intently at the painting but in an affectionate, embracing way.

Fig. 2. Visitors with "Starry Night" by Vincent van Gogh in the gallery "Innovators of the 19th Century"; Robert Gerhardt (Photographer), September 2020; The Museum of Modern Art, New York.

The contrast between these two photos indicates some important points about what has changed in the ways of seeing in the museum in the span of almost a century. And the fact that the analyzed space is the Museum

of Modern Art in New York brings other elements that are worth pointing out. As we know, MoMA became known for having institutionalized in the 1930s the modern art gallery format that O'Doherty would name the "white cube." He describes the modern museum as an oppressive and almost sacred place. In addition being intimidating, its architecture played an inextricable role in the art displayed there. Isolated from the outside world, the works seemed timeless and unquestionable. It was up to the spectator to contemplate them with reverence and detachment, almost as if their presence was bothersome. Or, as he ironically summarizes: " The Eye is the only inhabitant of the sanitized installation shot. The Spectator is not present."[11]

This absence is noticeable in much of the photographs in the collections of institutions, long documented without people. I found these two photographs in the MoMA Archives Image Database using the keyword 'visitors', which shows a small number of 238 results. Still, it is higher than other similar keywords, such as 'audience', with 20; 'spectator', with only three. Of course, this search does not correspond to the actual number of photos of visitors portrayed in the galleries, which can be found in other ways. But the fact that there is no clearer organization in the search system indicates how the spectator is not really present when trying to reconstruct the history of this institution by looking for him in this imaginary.

It is interesting to compare O'Doherty's quote with the images found on the hashtag #NewMoMA a few months after the opening of the museum's new building and the thematic reconfiguration of its permanent exhibitions in October 2019[12]. The project was celebrated for having "rethought what a museum of modern and contemporary art should be, righting the wrongs of its own history as well as much of 20th and early 21st-century museology," as Claire Bishop and Nikki Columbus summarize in "Free your Mind - A Speculative Review of the #NewMoMA"(2020). The review refers more specifically to the new format of the collection presentation, eliminating the chronological approach and reconsidering the Eurocentric view of global art that has prevailed for a long time. But if we look at this set of photos, one can speculate if this would not also be one of the reasons for greater integration of people in the space. Unlike in other times, the spectator is more present

than ever, placing himself in the image of the new museum in every possible way and pose.

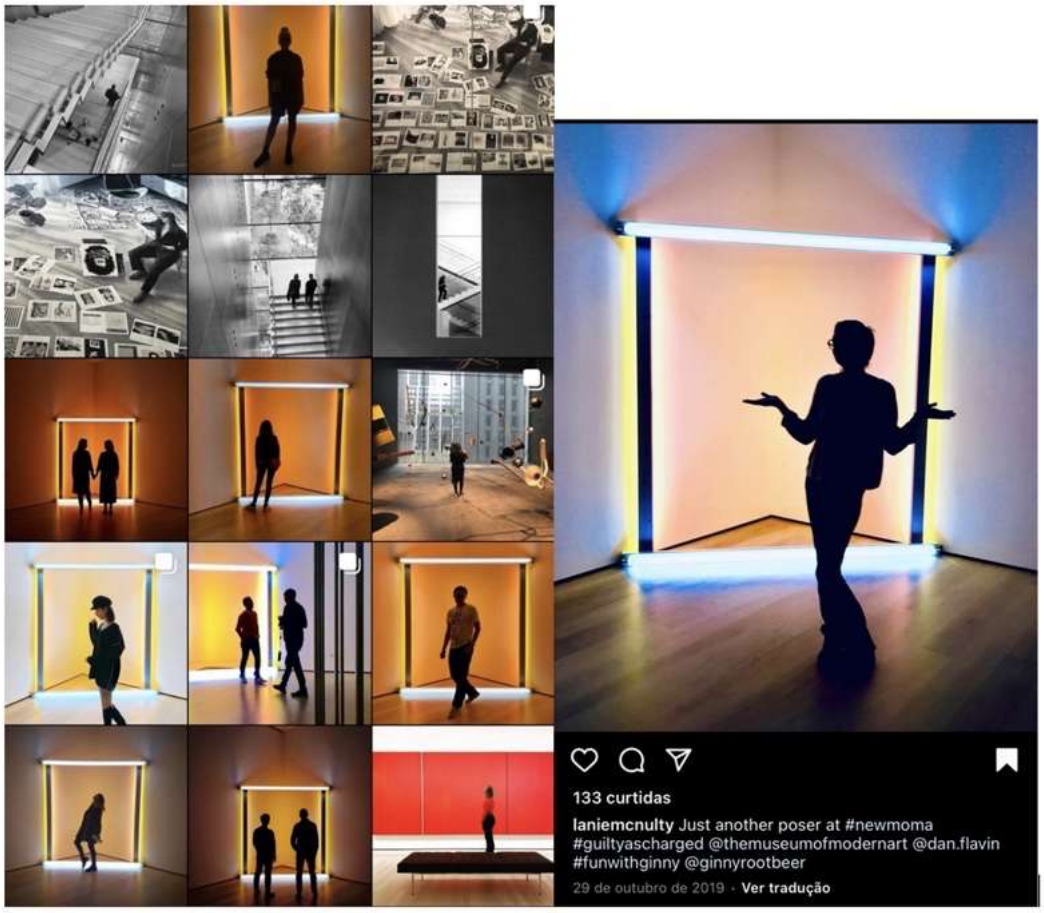

Fig. 3. Images found in the hashtag #NewMoMA in search made in 2020, on Instagram.

Of course, in today's context, one cannot ignore other obvious consequences of this fruition that sees everything laterally and in the time of a Reels video. It is very easy to fall into the most banal experience of art as immediate consumption, turned into a background of selfies in search of cultural capital to feed a narcissistic culture. If the body is freer from disciplinary control and present in the space, it is the gaze of compassionate attention that today seems to be on hold and with its days numbered.

But this is not the focus of the argument here. One of the points I try to demonstrate in this comparison of images of people in the museum at different times is how the idea of full attention is not so different from the distracted *posers*; and that staging, too, was often part of a composed vision that imagined itself to be free from outside interference. After all, no one is capable of self-watching without some degree of self-representation – and today's 'posers' are not so different from the adepts of staged contemplation of other eras. Often, what seems like a distraction may be just another form of attention, less subordinated to the control of bodies and vision that marks both the history of museums and optical devices.

Ways of seeing and copying: mimesis and repetition

The idea that posing for a photo is itself an image is widely debated in the history of photography. In *Camera Lucida* (1980), Roland Barthes sums up well the set of forces in the imagery behind a portrait, combining at the same time " the one I think I am, the one I want others to think I am, the one the photographer thinks I am, and the one he makes use of to exhibit his art."[13] The result of these four "repertoires of images" is a process in which " I do not stop imitating myself, and because of this, each time I am (or let myself be) photographed, I invariably suffer from a sensation of inauthenticity."[14]

What happens when the game of imitating oneself for a portrait gains other layers of representation? Such is the case in which visitors who are photographed in a similar situation to a particular work, or people reconstructing the scene of a painting at home, as happened in the first months of the quarantine. Inspired by the Instagram account Tussen Kunst & Quarantaine (@tussenkunstenquarantaine), many museums adopted this challenge that soon went viral on Instagram.[15] Versions inspired by the context of the pandemic were the most popular. A retelling of Magritte's *The Lovers* (1928) shows a couple kissing with their faces covered with dishcloths; Rembrandt's *Anatomy Lesson* (1632) is recreated by a group of doctors in a hospital, while Leonardo da Vinci's *The Last Supper* was the champion of new versions, many with the meeting of the apostles adapted for the virtual platforms.[16]

But this "way of seeing and imitating" had started before with another popular hashtag, #PeopleMatchingArtworks. The project was created by Stefan Draschan (@stefandraschan), who produces much of the images, but also reposts many he receives from other visitors. If in #BetweenArtandQuarentine people staged the situations, here the idea is that visitors are caught accidentally matching a certain artwork – although it is not possible to know if the catch is also part of staging.

Again, this trend of 'seeing and copying' in museums didn't start as a hashtag on Instagram either. Throughout my research in collections, I observed how this game of resemblance between work and viewer was present in photos from other times. This 1988 image by Elliot Erwitt is one example. We do not know if he directed the scene and asked the girl to pose next to the four Egyptian sculptures at the Metropolitan Museum of Art in New York, perhaps to give a sense of scale. But the fact that he created this situation is telling of how much there seems to be a natural propensity to imitate what we see in these spaces – a performative way of seeing that uses the body to produce another similar image.

Fig. 4. Elliot Erwitt, Metropolitan Museum of Art, NYC, 1988. Found in the hashtag #museumvisitors, on Instagram.

Erwitt is another notorious museum photographer. Part of this material is gathered in the book *Museum Watching* (1999), with photos taken between the 1950s and 1990s – exactly the period before photography became popular in galleries. In his text, Erwitt comments on his interest in making "a direct connection with what's on show."[17] Statues are highly conducive. Several photos capture these moments of reciprocity, of people repeating a gesture represented in the sculpture or posing as if they were one.

However, even if this way of seeing and copying was already present in images before the digital era, it is in the informational spaces of the networks, governed by the similarity game that feeds the artificial intelligence mechanisms, that they find a greater identification and start to circulate with more force.[18] It is not by chance that many of these photos, like the Erwitt one, I found in the same hashtag along with other recent ones of people matching works in museums.

But imitation in art also has a much older history and was widely debated in classical antiquity. The original definition of mimesis came first from Plato, for whom mimesis was understood as a banal imitation of what human beings grasp through the senses. The sculpture of a man, for example, would be an attempt to copy a man as he appears to the sculptor's eyes. Therefore, mimesis was seen almost as a copy of the copy, a false and imperfect version produced by the world of appearances mediated by the senses. In Aristotle's view, mimesis was a version that would better allow a knowledge/recognition of reality. For him, instead of a distorted copy, mimesis was a representation - and art, in this sense, would be an improved version of reality, providing new elements to better understand it.

There is much to be drawn on mimesis when analyzing the fusion between visitors and work in museums today. If we are guided by the Aristotelian reading, one can look with some optimism at the phenomenon, thinking that this is a way to better access and understand the work in question. But it is also possible to follow the Platonic view and interpret the gesture of imitation as yet another attempt to reproduce an original vocation

of art as something that repeats itself indefinitely, in the failed attempt to capture a world that has always been inaccessible.

If the act of seeing and copying seems inescapable, whether in museums or in the logic of networks, perhaps the way to break this cycle lies in other initiatives that escape the traditional model of the primacy of vision. This is what we analyze in the following section about other ways of (non)seeing that refuse the primacy of vision.

Ways of not-seeing: demusealizing the museum

Maybe one of the most unusual ways of seeing in museum are the actions in which one is deliberately choosing to not *look at all*. This could be a performative strategy, as the experience conducted by the artist Bruno Moreschi at the Hermitage in St. Petersburg. In this experiment, as a way to confront the Russian museum's "strategies of gaze persuasion," he chooses to conduct blind tours over the course of four months.[19] Refusing to see the museum in person, Moreschi makes a photographic series with his eyes closed.

The visual essay is revealing in several senses. First, by the surprising composition of the images - unusual angles that capture details at first irrelevant, and yet essential. With the focus shifted away from the artworks, the ostentatiousness of the architectural elements, chosen with the intention of attracting the eye and increasing the visitor's power of attraction, is revealed more clearly. By outsourcing his vision to the camera lens, defining it as a visual orientation, he takes to the extreme an experience so common nowadays of having one's gaze remediated by the cell phone, to the point that this way of seeing is the first (and sometimes the only) contact with a given object. It is interesting to think about how a gesture that has become banal, and to which is attributed the fragmentation of attention, can open possibilities of a way of seeing that happens first with other bodily senses, leaving vision as the last step of the process.

How people are portrayed by him is also revealing. Since they don't notice they are being photographed, and the photographer doesn't see them either, it is a rare spontaneous register. After all, the representation of visitors

in museums is rarely documented outside of a representational ritual – from the well-behaved pose of the past to the self-representation of today's Instagram posers. In Moreschi's images, people are seen in absolutely banal situations. Quite different from the ones we find in the hashtag #HermitageMuseum, for instance. There are many portraits taken from the bottom up, with the visitor putting themselves in the scene with all the grandeur they see in the surrounding architecture. There is also an interesting fact: in many of these registers, most of them made on the main staircase of the Winter Palace, people simulate a pose of authority, placing themselves as the protagonists of that story.

And this is probably a key idea behind all these self-presentation trends in museums and the circulation of these images on social media. Although it is certainly difficult to classify these actions as artistic fruition experiences, the fact is that they somehow reveal an audience's digital agency to dismantle museum discourses, by *demusealizaling* the museum itself. If these institutions are in the spotlight again in what is called the "third memory boom,"[20] characterized by more participative digital modes of circulation and connectivity very different from previous modes of memory representation, these movements should not be ignored at a moment when they are being questioned about their role in today's society and in the future.[21]

In parallel, museum visitors are also engaged in another “way of not seeing”, even when it happens involuntarily, as one can see in the images also organized by Stefan Draschan in the hashtag #Peoplesleepinginmuseu. Again, we cannot attest to how spontaneous these pictures are, since sleeping in museums doesn’t seem an ordinary situation. But what the very existence of this collection indicates, as well as the body position of some of the people portrayed, is that the *museum fatigue* is still an inescapable effect on the way of experiencing these spaces.

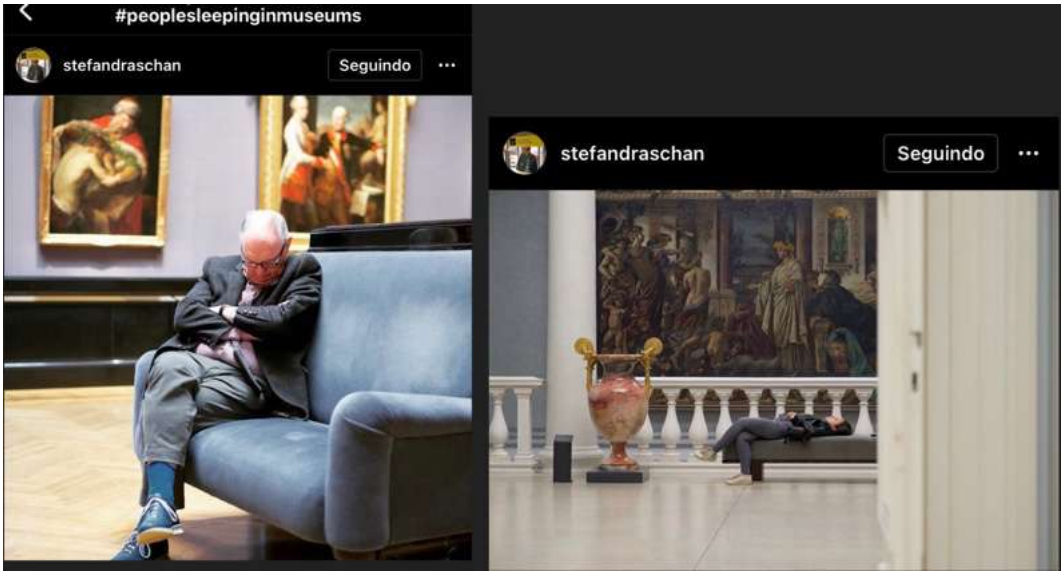

Fig. 5. Images found in the hashtag #peoplesleepinginmuseus, created by @stefandraschan, on Instagram

Conclusion

In recent years, visitors' ways of seeing in museums are certainly freer from the disciplinary ties that have marked the history of these spaces. The permission to photograph also coincides with the period when many institutions started to emphasize the importance of social interaction. Renovation projects at the MoMa and Tate Modern, in London, both announced intending to expand meeting areas, took place at the same time as the use of cameras by visitors inside galleries becomes more accepted by most institutions.[22]

It's hard to say what started first – whether the socialization of networks influenced the socialization of museums; or being social spaces by nature, the adhesion to the network format was, therefore, more fluid and immediate. The fact is that the changes in recent years, including the 'social' nature of these platforms, present new challenges in how institutions use these formats often uncritically or lacking attention to some arising phenomena.

The case of the hashtags of people in the museum, in contrast to the difficulty of researching this material in the official collections, are a good example of how initiatives created by the public in networks can offer methodological paths for research. The way the public produces and organizes this material through a huge variety of keywords that spontaneously emerge and become collaborative projects could perfectly be adopted as a model to be used in museum archives.

Lastly, it is hard not to think about the changes in the way of seeing in museums two years after the beginning of an intermittent pandemic state that has been changing our perception of real and mediated environments. It's early to know about the impact of the re-introduction of body control mechanisms, such as sanitary restrictions. We can certainly speculate, however, that the refusal to look in the museum gains other meanings in a moment in which people return to occupy these spaces still with a fragmented and compromised perception of how the world is outside the screens.

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22. Besides MoMA, mentioned above, the new project of the Tate Modern, witch opened in 2016, is also quite significant in this sense. As I wrote in an article at the time, the speech by then director Chris Dercon announced the intention that the turbine room uniting the two buildings would be used as "an environment conducive to encounter, a place for activities." Lavigne, Nathalia. Tate Modern, 15, plans expansion. Folha de São Paulo, Ilustríssima. 5/4/2015. Available at: < https://feeds.folha.uol.com.br/fsp/ilustrissima/214710-tate-modern-15-planeja-expansao.shtml> Accessed May 5, 2022.

From No Place to No Image: Iconic Migration

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ABSTRACT

Among many objects that have migrated through the history of visual perception, iconic image plays a unique role, namely of the universal model of vision. Listing canonical features of the icon as a concept — nonessential process character, making a path to an overflowing presence, not being made by human hands, "poor" visual characteristics — the author underlines the universal model of addressing which icon performs in any space, and before every "audience." Moving on to concrete histories of the iconic that include "wars of images" as part of real conflicts, the author notes a relative regression of completeness of iconic universality, detailing the icon painting technique with its simple initiate gestures of engraving, corresponding to the "yes-no" principle of information theory, maybe considered as a basement for new universalism. Its initiate gestures are as simple as lines of engraving that, in turn, correspond to the "yes-no" principle of information theory, though leading to different results. Finally, transiting to contemporary image variations based on algorithmic elaboration, the author provides two examples and concludes that algorithms allow the production of unlimited series of "objects" that are too universal for human perception. It poses the question of the possibility of universality to a level that affects the construction of "human" as such.

KEYWORDS

Icon; Algorithm; Human; (In)Visible; Universal Addressing

Today, more than ever, circumstances of very different types – above all, political –, are pushing us away from using the concept of "universalism". More and more voices claim that the world is multi-polar, that there are no universal models, no universal values that would be shared by everyone, no universal rights that would protect everyone on this planet. However, as far as the visual experience is concerned, it is the idea of universality that was the basis of both the visual paradigm (the experience of seeing, as well as the fact of exhibiting the work of art, which also organized narratives of art history) and migration processes. Differences from culture to culture are obvious only against the background of something common, even if a commonality is only hypothetically implied, as a kind of ideal type.

For centuries, all components of the visual field were considered appealing to everyone without exception, and the process of vision itself, unrelated to the level of language proficiency, was seen as universal in its communicativeness. The work of art was seen to involve both its creator and its viewer into communication, each time forcing the latter to involuntary exclamation "ah!", by which, as the art theorist Thierry de Duve wrote, an authentic work of art is recognized.

Only in recent decades, voices of non-Western art are being raised. The global history of art, earlier written mostly by representatives of Western culture, crumbled into many different histories that now have to look for common ground among themselves, suspending not only the universal but also the general. At first glance, these processes leave nothing of the possibility of universalism, declaring all cultures and all types of arts incomparable with each other.

After all, Claude Levi-Strauss[1] summed up his ideas for UNESCO in the following way: all cultures are different, and no two are the same. With regard to art, one can go further and assert that each creator is unique, that even formal contemporaries in the same country with the approximately same set of sociopolitical and economic conditions are not comparable to each other, and only authors of various art histories risk to put them in one narrative on rather vague reasons. Such absolutization is possible, it is also possible that it is logically consistent and corresponds to the ideal of an artist.

However, it is important not to lose another obvious tendency and discover forms (components) that work in different contexts, by different artists, even in different eras. Of course, such components turn out to be quite specific in the sense that they often partly lose their object characteristics for the sake of functional ones: it is not so much something visible physically, directly to the eye, as something transgressing, passing through different artistic "hands", different types of media, different societies, different territories, epochs, layers of time. Examples of such components can be found in Roland Barthes' "*punctum*" theory applied to photography, specifically for artistic photography, or Aby Warburg's "*pathosformel*", which functioned in different types of media (drawings, bas-reliefs, oil paintings of course, and even literature, as by Warburg-inspired Erwin Panofsky). Warburg developed his own way of constructing the history of art, based on elusive *something* that arises again and again on/in the image, taking different forms, through periods of time, building an image from itself. For example, on Panel 47 of his famous Mnemosyne Atlas project, Warburg, juxtaposed images from Giotto and Donatello to Botticelli and Ghirlandaio, further widening and complicating the role of the nymph as a symbol. A bearer of pathos formulas or “dynamograms,” it oscillates between creation and destruction. The analysis of numerous attempts to determine what *pathosformel* means in few written works of Warburg himself and members of his institute demonstrates the connection of this concept with hard-to-fix affectivity, perhaps with something extra-personal, but yet felt at the level of sensory perception. At the same time, it is important to emphasize that from this slippery and elusive pathosformel, a whole highly personalized history of art, the "personal" Atlas of Warburg, unfolds.

Something very similar happens with Roland Barthes's conceptual structure of *studium-punctum*. It is not difficult to explain what a *studium* of photography is, because all the content of the established ways to construct art history, the entire visual field of photography is actually collected here: by whom, when, and where photography was taken, who was photographed, in what circumstances, what it represents, what visual components that viewers see may mean or what they meant at the moment when photography was

made. It is much more difficult to describe why few photos *touch*, though in terms of *studium* they are no more remarkable than many others. In fact, hundreds of pages of Barthes's book *Camera lucida* are an explanation of what *punctum* is. And what is again characteristic, Barthes prefaces this explanation formulating a new science of photography on the basis of *his personal private impression*: as in the case of Warburg, we see here the unfolding of a personalized narrative from the extremely difficult and unfixable functionality of something that is only subtly felt. And what may be even more important, both *pathosformel* and *punctum* seem to be indifferent to the specific time periods in which they left their traces: a photograph made fifty years ago can enter our contemporaneity today, notwithstanding all differences between epochs.

Therefore, both examples can be considered as a manifestation of something common, related to the category of universalism at another level, overcoming only the substantive level physically present on canvas before our eyes. However, *pathosformel* and *punctum* are units, even if we do not see them directly, only their manifestations. One can go further and link the work of the universal with the work of interconnected and, to some extent, interchangeable units (not in the sense of structuralist systems of connected pairs of opposites). This would not be just a logical exercise. It is a necessary consequence of the influence of information technology which not only scattered usual connections but also dissociated many objects into components so that now they can be collected in any combinations, not necessarily human-friendly (artist Hito Steyerl conclusions[2] may seem exaggerations, but they enable to see problem of "right connection", and isn't it the beginning of universalism?).

While expressing the hypothesis that the remnants of universalism can still be found in technique by which the work of art is produced – in contrast to its substantive characteristics presented in the visual field – this article aims to consider an important – at least for the Christian tradition – model of vision that is the iconic, in order to indicate what type of subjectivity it implies and what modifications it undergoes while being

affected by another type of technique, namely the algorithmic, which tries to "universalize" us today.

The iconic as a (universal) model of vision, the icon as a concept

It is important to consider the icon as a concept for at least two reasons. Firstly, many visual researchers agree that the icon is not just the oldest model of vision within the framework of Christian culture, which legitimatized the field of the visible in general and enabled humans to trust their eyes. A strange model that has built connections between what is visible and what cannot be seen. Secondly, it is a model built on universality. The completeness of its universalism reaches such an extent that even individual specialists, both theorists like Marie-Jose Mondzain, and theorizing historians like Hans Belting, both icon experts initially, went far into centuries in dating the emergence of the universal model of vision: Mondzain actually spoke about the technique used to create drawings in the Chauvet cave (30,000 years ago) as already an anthropo-producing technique[3] although per-Christian, Belting[4] found the origins of media theory in a processed and aestheticized skull (7000 years ago). This looking back indicates, in my opinion, not so much fascination with archaic, as the need to find units that would be universal and effective in a long time duration.

At the turn of the 20th and 21st centuries, the interest in objects that were not historically encompassed or, in principle, could not (or should not) be encompassed by the history of art, turned to the origins of figurative tradition. One of the reasons are the so-called disembodied images that came to the scene. Further, I am going to refer to several works devoted to the problem of the image.

It is essential to start with Mondzain's main work[5] because of its theoretical potential. Although it formally describes the oldest, the most fundamental historical moment — the disputes that ended at the Second Council of Nicaea (787) with the legitimization of a special type of image. It is believed that the possibilities for the existence of art in the European West were laid then. Mondzain herself believes that iconophilia and iconoclasm are two ways of relating to the visual. They can be traced back to the last decades,

to the transition between the 20th and 21st centuries. Like some others of approximately the same time period, this book presents icon not so much as a specific type of image preceding the secular pictorial one, but the icon as a model of vision, that is, the icon as a concept. Of course, many earlier works treat the icon similarly, and I will also say a few words about one of them further.

The following aspects are fundamental in what role the icon plays in the organization of the visible field and how it orients it:

a) the icon can show the invisible because its own content is being emptied. In order to solve the paradoxical task — to avoid accusations of idolatry, but to give legitimacy to the visually percepted image of the invisible — the Church Fathers formulated the doctrine of *kenosis*, according to which the visual components of the icon, its pictorial series, through the use of several special techniques, are "impoverished," go away to serve only as anagogic means, only conditions for meeting of the believer with the One to Whom prayer is addressed;

b) another aspect is inextricably linked with the previous one: the icon is not an object, since the movement (or "jump", or "event") is fundamental for it. In comparison with subsequent pictorial image built according to the laws of direct perspective, the icon seems strangely static. We can literally trace how images at the beginning of the Renaissance were not using perspective, how gradually they were departing from the iconographic principles of placing "third-party" plots from "terminals" (framing the central image by small square images with scenes from the earthly history of a particular saint in a special type of icons) moving figures into the main space of the image and in the same plan of the picture. That is, we directly see how an image was being restructured, reconstructed technically, as it went from iconographic to pictorial, and this process took decades. Before the invention of direct perspective for the construction of pictorial images by artists of the Italian Renaissance, iconography used what Pavel Florensky, a priest, mathematician, scientist of the first third of

the 20th century proposed to call "reverse perspective" (although historically it appeared earlier then "direct" one), to denote the movement set by the icon in contrast to the painting: icon does not take the viewer deep into space, but goes to him from the depths. The icon is inherent in this multidirectional movement, both inward and outward, because it is intended to organize a meeting place. Therefore, the process nature of the icon, its mobility and its "withdrawal" from the material visually perceived components also lead it away from being a "thing" and incurring terrible accusations described in the Old Testament;

c) the universality of addressing, connected precisely with the field of the visible: unlike the sacred text and the tradition of interpretation adjacent to it, the study and knowledge of which required literacy and appropriate education, the icon appealed to everyone, literate and illiterate, representatives of all traditions and strata;

d) the universality of the distribution of such a scale that allowed the image of this type to overcome any boundaries, from intro-spatial to geographical. Unlike other "objects" of the temple space, the icon performs its functions anywhere: it can be taken out of the temple space not only for exceptional cases of big church holidays or heavy military battles, but to be present in homes of believers (in Russia, rich parishioners built chapels and "brownies churches" with iconostases, and the less well-off placed icons in the "red corner" of the hut), and in a "pocket" format to be carried everywhere;

e) not made by human hand: if the icon were the creation of the artist, though inspired by some force, but with all the ensuing consequences that have been formed over time (manner and techniques, the "hand" of artist, his name, by which he signed his works, those who would like to be imprinted by these very hands of this particular artist, etc.), icon could not have rejected many serious accusations.

We see that a canonically defined icon is a complex processual model — therefore, more precisely, a concept. At the same time, this concept is formulated as universally valid, at least to a double degree: the icon appeals to everyone and appeals everywhere, and this formulation applies to the visual field.

Iconic *in situ*

A few examples of studies that are rather historical in nature or combine theoretical and historical components are enough to show the instability of universal characteristics (specially, d and c). Many of them are connected to the so-called "wars of images". Even if some researchers emphasize that these wars are waged by specific powers on specific territories, while the images themselves are certainly "quiet" in the ancient Byzantine sense of the word, the very facts of these wars hint that universalism tied to the field of the visible may have uncertain completeness of universality.

The last chapter of Hans Belting's fundamental work[6] containing a huge factual material from territories with traditional domination of Eastern Byzantine image type, but also enhanced with examples of icons from Western Catholic territories, tells about transition to another version of worship in Christianity, namely the Reformation. Not finding in Luther texts explicitly formulated prohibitions of icons (icons were considered optional, since they did not fallow directly one of the most important Luther's principles of *sola scriptura*), Belting tells not only about partial damage of icons by new Protestants, but also larger-scale destruction and removals of images from religious institutions during the spread of Protestantism.

Another difficult group of examples is related to colonialism, that is, civilization clashes in various territories. Serge Gruzinsky, a specialist in Mexican culture, describes how the conquistadors' troops led by Edmond Cortez, advancing through territories where the visual field was marked with signs of local culture, destroyed these signs completely and erected in their place Catholic ones that they brought with them[7]. The decision of the Turkish government to change the status of Hagia Sophia and declare it a functioning mosque in July 2020 entailed not only a change in the visual components of

the space of this building (its icons were covered by curtains), but also numerous protests of representatives of other confessions, for whom this building is also highly symbolic (it is significant that many authors of Russian emigration wrote about the fantastic experience that St. Sophia allowed them to receive; Serge Bulgakov even founded "Brotherhood of St. Sophia" in 1923).

And here we come to another group of examples that are no longer religious or colonial, but reveal the role of the iconic for governments that declare themselves secular, and these are examples related to revolutions as monstrously destructive in their consequences as the French Revolution of 1789 and the Revolution of 1917 in Russia. Both were accompanied by destruction of temple buildings and irreparable damage of sacred images for the sake of new visual order and its new visual patterns.

The enumeration of these examples does not aim to open up again the discussion about religious fundamentalism which often takes the position of denying the signs of this world, including its visual order, or problems of conquering the visual field by secular powers which seek to arrange as many mechanisms of controlling eyes as possible (the surveillance problem, which owes much to Michel Foucault, is an important issue which we have no possibility to expound here). These examples imply that universality of the complex, multi-level iconic model, when it comes into socioeconomic and political space, decreases, that is, it does not act in the visual field equally for everyone. This, in turn, means that the field of the visual is not universally transparent for everyone in any place of the globe. Further, different activities tend to structure their appropriate visual orders. More then, such spheres as ethics were taken out of the visual field by the most radical researchers decades ago (for example, Emmanuel Levinas actually wrote that we do not see an ethical action, therefore, face is not a visual phenomenon: it appeals to us on another level; these ideas make Levinas a representative of modern iconoclasm).

Then, suppose we are ready to agree that universalism does not characterize either the visual field nor the main model for orientation in it. In that case one may assume that universality is more operative at another level, for example, the level of technology. Strictly speaking, the destruction of one

icon does not destroy the principles that organize it and does not eliminate the possibility of tracing the path to which the icon indicates. And if we agree that the icon is not a completely universal model, then the description of the technique that we are going to offer further may also be non-universal. But this step seems necessary if there is a desire to understand better the current situation related to the spread of information technology and data analysis.

Icon painting technique

It is important to consider what exactly the process of painting the icon is about and which techniques are involved in it, through the example of the Pavel Florensky works. Although he was a priest, on the one hand, not everything in his views corresponds to the accepted canon. On the other hand, the versatility of his activities makes him more interesting, especially for secular readers, making his works more universally accessible.

First of all, in this context, his understanding of icon painting techniques in the work "Iconostasis" is important[8]. Florensky places a collection of icons on the border of the visible and invisible.

Among the many important aspects that concern the icon, it is important to pay attention to engraving which Florensky considered as "antipode" of the icon. This is also important for the final part of this article related to algorithms. Florensky differently described pigments and surface marks in cases of an engraving and of an icon:

> (in the engraving) "the printing ink serves only as a sign of distinguishing places on the surface, but has no color, whereas the strip (in oil painting) has.. if oil painting is a manifestation of sensuality, then engraving relies on reasonableness, constructing an image of an object from.. combinations of rational "yes" and "no"[9].

That is, an engraving is a scheme of an image, and its "yes-no" principle is similar to the distinction 1-0, which is fundamental for information theory. Further, this scheme is of a technical type, like a kind of automatic drawing of lines.

In the icon, everything is different:

> in the pigment condition, in the method of its application on the corresponding surface, in the mechanical and physical structure of surfaces themselves, in the chemical and physical nature of the substance binding pigments, in the composition and consistency of their solvents, as well as pigments themselves, in varnishes and other fixers of the painted work and in its other "material causes" is already expressed the metaphysics, the deep worldview, which the creative will of the icon painter seeks to express with this work, as a whole[10]

That is, material components of the icon (wood, pigments and various substances), unlike the abstract auxiliary lines of an engraving, are the *material* for subsequent *transformation*.

Florensky writes up this metaphysics in detail, unfolding it quite canonically (since a similar image interpretation was suggested, for example, by John of Damascus). It follows the Aristotelian tradition, which calls metaphysics literally what is *behind* or *after* physics, but stays connected with physical data. Thus cosmic views of Aristotle himself are embedded here:

> the icon is painted on the light.. light, if it corresponds to the icon tradition, is golden, that is, it is light, not color..the normativity for the icon of the color of gold is clear: any other pigment would bring the icon closer to the ground and weaken the vision in it[11].

But in a strange (though rather only at first glance) way, Florensky also notes that the first stage of painting an icon resembles an engraving, with all the differences in the resulting work:

> this scratching of contours in wood is an engraving.. iconography begins with exactly the same engraving; first, the iconographer draws with charcoal or pencil the translation of the image, that is, the church-drawn contours, and then the painted is graphed with a graph, that is, it is engraved with a needle inserted into the end

> of a small stick, but the word γράφω itself means "I cut", and γραφή is an engraving needle[12].
>
> when the contour is applied, that is, the drawing is marked, successive layers of paint are applied, but this is still pure abstraction, almost invisible.. *technically speaking*, it's about filling the internal contour spaces with paint, so that instead of abstract white, a concrete, colorful silhouette that is beginning to be concrete, turns out. However, this is not yet a color in the proper sense of the word, it's just not darkness, almost darkness, the first glimmer of light in darkness[13].

That is, this description is balancing: it corresponds to the canon, and sometimes goes beyond it. But it is fundamentally important, in my opinion, to see how technique operates in this description: here is the "cut" and the drawing of lines, the "forming" of materiality of pigments and surfaces, their transformation into *something else*, their transition to another level. However, it is significant that for Florensky these levels interact, he sees them all at once, all the way, from pigments and wooden surfaces to ascent to the golden light: they are all an icon.

However, such splitting and cuts are not harmless operations. It could be argued that they function to identify "distinctiveness", to get it out of materials that allow for different variants and forms, i.c. materials that are in this sense indiscernible (Florensky wrote "darkness," using an old preChristian term used in ancient mythologies). Then the breaking of icons along other lines, the violation of their integrity can be considered another technical operation that erases the marks, misleads the contours, turning the components again to a state of indiscernibility (which acts as their sinking into invisibility). This breaking is also a technique and, in some sense, more universal than engraving and painting, resulting in a formless, unassembled, infinitely variable, unstoppingly transitional from one component to another, something almost "natural", if it was still possible to use this word.

Algorithmic temptation

Let us explain here why it is almost impossible to use the word "natural". It is not because Timothy Morton taught us to recognize that modern humans have no nature, that Anthropocene surrounds us by something other then nature. It is rather because the various IT technologies and 3D printing immersed humans in an environment where there are no unities, not even stochastic “entanglements” (to refer to Karen Barad’s speculations on physics) arising and crumbling, only "stopping", illegitimate for this infinite shaping process.

As it often happens, this is best illustrated by examples from modern technological art. The famous quasi-ancient statues of Egor Kraft from the *Content Aware Studies* project are material units located between what once took place and what cannot take place in principle, at least within the framework of human perception. They are neither restorations of damaged antique samples with "glued" lost parts nor "augmented" forms of some other reality, they are rather random stops of the algorithmic process. They are both aestheticized and formless, though not "uncanny" in the Freudian sense, there is nothing familiar about them for us. It's so tempting to write that there's nothing human about them, so they're not uncanny— they're just imperceptible, because we don't have any frames or contours that we could stretch to them. There's hardly anything that could build one network out of us and them (perhaps this "we" must be "augmented" so that everyone's "biological material" is to be processed algorithmically). The series they embody is too much for us, they are too full and seem to be a completely solved, successful universality – not one that is only assumed by us or moving towards us, but one that took place without our participation and is implemented before our eyes.

There are many other examples. The resource *generative.hut* delivers many figures developed on screen before the eyes of the viewer, and their transformations are endless. It is fascinating that the possibilities of figures appear further and further, even though our human capacities could hardly imagine a fragment of these figures. If universalism is connected with

completeness, then these "objects" are more than universal. The technique, more precisely, the algorithm's work, plays a primary role in it.

In other words, a certain image scheme seems to replace the previous one before our eyes. In a certain sense, they are both inhuman, non-mimétique, and do not contain similarities with what human looks like. The first, the iconic, is what triggers the transformation of the "too human" and may lead to the upper level. But, what does the second, algorithmic, trigger? Are we just a “biological material” to be recollected, as a young artist told me, working on algorithm-based dance performances? It is not likely that at least some “we” agree.

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Endnotes

1. Claude Levi-Starss, "Race et histoire", in *Anthropologie structurale deux* (Paris: Plon, 1973).
2. Hito Steyerl, "Proxy Politics: Signal and Noise," *e-flux Journal*. 2014, no. 60. https://www.e-flux.com/journal/60/61045/proxy-politics-signal-and-noise/
3. Marie-Jose Mondzain, "What does seeing an image mean?" *Journal of visual culture*, 2010. Mondzain argues here that making a picture by hands on a cave wall and stepping behind to watch it made humans humans.
4. Hans Belting, *Bild-Anthropologie: Entwürfe für eine Bildwissenschaft* (Munchen: Fink, 2011).

5. Marie-Jose Mondzain, *Image, icon, Economy: The Byzantine Origins of the Contemporary Imaginary*, trans. Rico Franses (Stanford University Press, 2004).
6. Hans Belting, *Likeness and Presence: A History of the Image Before the Era of Art*, trans. Edmund Jephcott (Chicago: University of Chicago Press, 1994). Ch. 16. It is characteristic that on the cover of the German edition published in 1991, there is a Latin image of the so-called "veronica" painted by Memmling, on the cover of the American edition there is an orthodoxe icon, on the cover of the Russian edition, published in 2002, there is also an orthodoxe icon.
7. Serge Gruzinski, *Images at war : Mexico from Columbus to Blade Runner (1492-2019)*, trans. Heather MacLean (Duke University Press, 2001).
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9. Florensky, "Ikonostasis", 96-98.
10. Florensky, "Ikonostasis", 88.
11. Florensky, "Ikonostasis", 136.
12. Florensky, "Ikonostasis", 132.
13. Florensky, "Ikonostasis", 133, 138 (italics added).

Exhibiting the Posthuman: A Dispositive Analysis of the Postmodern Public in *Les Immatériaux*

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ABSTRACT

The paper focuses on the 1985 exhibition "Les Immatériaux" and discusses the posthumanist thematic which underlies the curatorial program. It examines the ways in which an exhibition 'produces' its visitors, drawing on the Foucauldian method of dispositive analysis, which is analyzed as a further development of discourse analysis. It maintains that displays and spatial arrangements in an immersive, interactive, and multi-sensory exhibition constitute cultural technologies that trigger embodied acts that invoke, animate, regulate, and act upon the production of their viewers. The paper mainly contributes to visual methodologies that analyze subjectification as articulated through fields of power/knowledge embedded in post-representational regimes of visibility.

KEYWORDS

Media Art Methodologies and Historiographies; Museum Studies; Posthumanism; Dispositive Analysis

Brian O' Doherty was perhaps the first to discuss the ways in which the modern gallery produces the bodyless, eye-centered beholder – a concept based on the forceful and artificial separation of the senses. Jean-François Lyotard, one of the curators of the 1985 exhibition "Les Immatériaux" at the Centre Pompidou, remarks, however, that this beholder emerged during modernity with the introduction of the perspectival system and the panel painting, and in his exhibition proposed a different notion of the beholder/participant[1]. Furthermore, media art exhibitions such as "Les Immatériaux" enhance the significance of sensory codes that foster a heightened sense of synesthesia and somatosensory awareness, since they support the viewer's in-depth involvement with technological and informational apparatuses and networks.

To examine the ways in which apparatuses work and 'produce' their visitors, I will deploy insights from the Foucauldian theory of subjectification. As with all social constructionist theories, the individual is not understood in an essentialist but in a performative manner, meaning not as an autonomous and sovereign entity but rather as an *effect* of the discourse in which said individual partakes. The paper maintains that the formative role of media technology corresponds to the emergence of the post-industrial, non-anthropocentric, and posthumanist notion of the self, rooted in the informational networks of contemporary technoscience. Drawing on media theory's posthumanist insights, which reconstruct humanness from the machine world, rather than vice versa, subjectivity is entangled with aesthetics and digital technology's materiality that perpetually recompose it. Here, I seek to demonstrate that displays such as those deployed in "Les Immatériaux" serve as a Foucauldian dispositive (*dispositif)* that produces posthuman subjectivities entangled in knowledge/power relations. Displays constitute cultural technologies that trigger embodied acts that invoke, animate, regulate, and act upon the construction of their own viewers articulated through viewing practices and embedded in post-representational "visibilities," a term used by Gilles Deleuze to describe Michel Foucault's methodological approach.[2]

I will pay particular attention to the exhibition's spatial layout (*mise en éspace*), notable for its labyrinthine structure, the suspension of walls and vitrines, the absence of separate rooms, the conflation of entrance and exit area, the lack of explanatory labels, the use of mirrors and other semi-transparent spatial barriers, as well as the deployment of devices, such as monitors, keyboards, interactive screens, and headphones. The visitor was enveloped in whole environments (a maze of some sixty-one different so-called stations) with interactive and networked installations. In addition, each visitor was given headphones at the entrance to hear texts and sounds broadcast in thirty-one infrared transmission "zones" distributed over the entire exhibition area. During the exhibition, the visitors could also use five Minitel terminals connected to a central server to access the entries written by twenty-six writers, including philosophers and social scientists, who contributed to one of the earliest collective and networked writing experiments. The exhibition used the new media technologies of the time (notably pre-Internet) both as the means of display and as a topic of the exhibition.

The exhibition's display system aimed not only at making the visitor an active participant but, most importantly, at demonstrating the new status of the human, which steadily develops towards what early commentator of the posthuman condition, Kathrine Hayles, called an "embodied virtuality."[3] According to Hayles,

> "the posthuman view configures human being so that it can be seamlessly articulated with intelligent machines. [...] The posthuman subject is an amalgam, a collection of heterogeneous components, a material-informational entity whose boundaries undergo continuous construction and reconstruction."[4]

Hayle's critique of the all too optimistic visions of the proponents of the posthuman, a hypothetical future being "whose basic capacities so radically exceed those of present humans as to be no longer unambiguously human by our current standards"[5] corresponds with Lyotard's questioning of

the foundational assumptions of humanism following the ideas of the Enlightenment. By using the concept of the "inhuman", and in line with the anti-humanistic philosophical tradition initiated by Nietzsche and continued among others by Heidegger, Foucault, and Derrida, Lyotard described all those things that humanism has excluded from its definition of man, while he criticized the dehumanizing effects of modern technology that can already be observed today.[6] On the other hand, he saw in them the chance to open a space of possibilities, since they do not fix the human being to one stereotype of agency obtained by means of reason and ideals such as autonomy and progress. This critique of the anthropocentric humanist philosophy and its legacy is articulated in the exhibition as a critique of progress-oriented technoscience, which dictates everyday life and establishes the proliferation of devices and hardware (*matériels*) that handle digital information, as Lyotard and his co-curator design theoretician Thierry Chaput make clear in the printed material accompanying the exhibition.

It was clear to the curatorial team of the exhibition that technology was a sign of the decline of the ideology of the modern, which, although offering the means to reflect upon itself, placed humanity once again in a condition of a technologically devised immaturity. In a lengthy section of the material accompanying the exhibition, Lyotard explains how the notion of the exhibition is linked to postmodernism's questioning of the subject:

> There is a relation implied in this concept of exhibition, the relation of a subject who visualizes objects, works, who confronts them, who looks at them face-to-face, with this visualization – that of those who have conceived the exhibition – controlling it through the spatial layout itself. Thus on the part of the recipient who is the visitor, there is the principle that he is foremost a man who looks, an eye.[7]

Lyotard is clearly aware of the subjectifying aspects of exhibition-making since he refers to the aim of the exhibition as being:

> to question, and I would even say to disquiet, the idea of the will and intelligence of an all-powerful subject, in order to produce instead a sort of effect of modesty in the anthropological atmosphere in which we live – the problem is that it effectively risks ending up in failure.[8]

Criticizing humanism means to abandon as an illusion the notion of the subject as well-defined and of autonomous agency through self-knowledge while highlighting the contradiction –but also the ambiguity– of any kind of identity. Moreover, if it denies the distinction between material body and immaterial soul, it proposes an understanding of man as a non-dualistic entity. The critical posthumanist attitude is clear in the text (which is to be found in the exhibition's guide *Petit Journal*) that accompanied the first exhibit, an ancient Egyptian relief showing a goddess: "The symbol of the given life marks what is at stake in this manifestation. Is there something today that man is meant to be? Do we have to give the soul back, that last sigh?"[9]

In this area, the breath of a person could be heard in the headphones used by the spectator. The attention of the visitors would be focused on an activity of their own body, an activity that is not perceptible under everyday conditions. Also, in the next room, the actual entrance, in which the visitor could hear samples of blood circulation, the mise-en-scene made the viewing subject take the place of the exhibit. At the same time, the viewer was confronted with a critical deconstruction of humanist discourses related to human existence, notably the religious dogma of the soul's immortality.

Such a shift, in which museum visitors are immersed in a consonance of sensations and various contents, demonstrates clearly that this kind of temporary media-based exhibitions has been developed into performative and experiential sites of personalized experience. For the site "*Corps chanté*," (zone 5), for instance, over 100 music video clips were sampled to elucidate the aesthetic of bodies, speed, and rhythm that prevailed in this new media format, which had appeared for the first time with MTV in 1981. Lyotard commented upon the fragmented and de-materialized body of the singers, which was visually constructed to match the music but also confronted the

viewers with new viewing habits and modes of reception. The site "*Arôme simulé*" included an installation from which different synthetic and natural smells were diffused, challenging the visitors to identify which of them was artificially created, accompanied by the projection of a computer-generated 3D animation of a virtual fruit basket.[10] The site "*Deuxième peau*" prominently featured skin samples produced by a variety of methods, including human skin cells, cultivated pork skin, and artificially created skin grafts. The station showed various samples of artificial skin that had been shrink-wrapped and nicely framed and presented next to each other on a metal mesh wall. Also, the site "*Langue vivante*" dealt with DNA research which had experienced rapid advances since the 1950s. The conception of the genetic code of DNA, and the decoding and encoding of molecular language, was central to Lyotard's understanding of language as a hinge of new ontological regimes. The station, "*L'ange,"* featured the work of the artist duo Klonaris/Thomadaki, in which the figure of the hermaphrodite played a seminal role while non-binary gender discourses were employed. However, as Antonia Wunderlich observes, the gender-changing subject is no longer a heroic ruler who knows how to subordinate the properties of matter to her will and her competence, but a ruling designer who adapts a matter understood as a message, i.e., as information, code or energy to her projects while modifying their basic properties.[11] In the image and film projection as well as through the lifeless puppets, the body is presented as raw material, as a naked substance.

Lyotard's curatorial concept deploys semiotics as its methodological anchoring. Modernity transforms everything into a message that has a sender/author, a recipient, a support medium, and an encoding/decoding system (code). As Lyotard maintains in an important essay published one year prior to the opening of the exhibition, this concept, which has become a "commonplace" can be used to discuss, for instance, architecture, art, cosmological or biological data.[12] The 'translation' work done in articulating the actual message/referent/content is both technoscientific and historical. However, this work destabilizes modernity. This is the meaning of "the negation in- in 'immaterial'." This is "a confrontation that opposes the subject,

the subject of will, of spirit, of the gaze." [13] For Lyotard, this unfinished business of the Enlightenment era has political repercussions since, "the idea of an enlightened, luminous society, a society transparent to itself, whether we call it a socialist or liberal society, it doesn't really matter, has receded considerably for us today".[14] Therefore, the exhibition is understood not as a presentation of the miracles of technology, but rather as a "mourning" of certain aspects of modernity that "seem illusory or dangerous." [15] The posthumanist vector of postmodern society is evident as a "reinforcement, an exaggeration almost, of the intimacy between the mind and things." [16] Biogenetic engineering, completely synthetic artificial intelligences, cybernetic feedback loops and advanced information management tools are the means through which "the human subject becomes no longer a subject but, I would say, one case among others, albeit a case which retains this privilege, until proven otherwise."[17] Lyotard discusses the technoscientific metaphysics of the subject (from Descartes to our time), which is also a metaphysics of domination, the domination of science over human beings, and the mastery of the human being over the physical world, although he maintains that this ontology is becoming less and less pertinent. Lyotard's posthumanist attitude identifies in it, "a decline of humanism, of the self-satisfaction of man within the world, of narcissism or anthropocentrism, and that an end of humanism may emerge."[18]

I maintain that the posthumanist thematic of the exhibition, which is mirrored in its unique spatial layout, finds a parallel in its intended reception format which corresponds with the subjectifying process implied by the Foucauldian notion of the dispositive. Although the notion of the dispositive was introduced into the realm of academic discussion during Foucault's lecture on January 18, 1978 at the Collège de France, it had been insinuated within a broader conceptual cluster of medial dispositives since the 1970s by Jean-Francois Lyotard, among others.[19]

The dispositive relates to the notion of the discourse, which is central to Foucault's arguments and methodology during his archeological phase, but also in his genealogical work, in which he developed a theory of power/knowledge. What Foucault was interested in studying

'archaeologically' are the conditions that determine which statements are accepted as meaningful and true in a particular historical epoch. These conditions are immanent and historical rather than transcendental or phenomenological. Possibilities of experience, which at the same time are disciplinary knowledge practices such as speaking and writing, are not defined by abstract laws but by actual historically and culturally specific social conditions.

Also, exhibition-making is a set of political technologies through which human beings are incited to constitute themselves. They are enacted in an institutional apparatus (for instance, a museum) and adhere to regimes of knowledge (academic art history, the art market, etc.) that determine what is true and false, which grants them coherence. In this regard, the modern art museum, with its rituals related to the presentation of art, its physical and moral constraints, but also the visual-material properties of art objects and art practices, belong to the larger modern administrative apparatuses for governing citizens analyzed by Tony Bennett in his seminal Foucauldian study on the emergence of the public museum.[20]

But by 1978, Foucault made in his discussion of discipline, security, and governmentality, an explicitly political and aesthetic decision to replace the conceptual term apparatus (*appareil*) with the term dispositive (*dispositif*), as Davide Panagia argues.[21] According to Foucault, a *dispositive* relates to institutional technologies, meaning, the practical techniques, "a disparate set of tools and methods" used to practice that power/knowledge based on the performative agency of the individual who enacts this practice, thus, conforming to its power.[22] However, art viewing also constitutes a Foucauldian dispositive, next to the *panoptic dispositive* or the *sexual dispositive*, on which discourse analysis often focuses.

However, and as Panagia maintains, Foucault's reading of Édouard Manet's paintings in his late 1960s lectures was instrumental in understanding his appreciation of various visualizations of power structures, such as the Panopticon:

> ... the Manet canvas allows Foucault to appreciate Jeremy Bentham's architectural drawings of the Panopticon as drawings on a flat surface and thus to read his writings as if they were tableau-like objects that render available perceptibilities. [23]

Panagia maintains, that "after Manet, Foucault will no longer be interested in looking at the function of representation in juridical and scientific writing, or political theory but will instead look for the practices of formal organization and arrangement in images.[24] One should not forget the opening section of Foucault's "The Order of Things" (1966), in which he discusses Diego Vélazquez' "Las Meninas", precisely in explicating in what ways the painting's surface compositional logic devises hierarchies of both vision and power.[25] The discussion, no matter how accurate or debatable it might be, is no longer about the inner mimetics of the painting, but is instead directed "at bringing us towards the missing spectacle, outside the painting, but implied in the painting, by the gaze of the figures therein looking out". [26] When discussing art, Foucault is concerned with how to paint the force of perception rather than representing the world.[27] In this regard, Foucault's discussion of the art of Manet and Vélazquez is mainly concerned with the place of the beholder, meaning, the 'formation of a viewer' that is always entangled with a set of historical, visual, and material dispositions; in short with regimes of visibility, enacted by dispositives. Therefore, Foucault discusses the Panopticon, as a "schema"[28], that is to say

> not as normative spaces of ideological positioning (the apparatus qua reflex) but as surfaces upon which dispositional powers do their work of arranging and adjoining (the dispositif qua complex of agencement).[29]

Foucault clearly makes an epistemological break with the Althusserian notion of apparatus (ISAs and RSAs) that has dominated the academic world since the conception of the term. This is significant because the dispositive evades the determinism of interpellation and the subsequent formation of an identity implied by Althusserian apparatus theory.

Foucault's basic materials were statements accepted as meaningful and true in a particular historical epoch. However, and notwithstanding the fact that Foucault focused his research on the system of stratified enunciations (which can encompass literary texts, oral confessions, court testimony, juridical rulings, etc.), one can argue that his epistemology, as Panagia suggests, is also profoundly ocular.[30] The dispositive does not function like (nor does it belong to the function of) a language. One can gain insights regarding regimes of visibility (and its subsequent production of effects of truth created within discourses) from other types of "material enunciations", such as diagrams, architectural plans, documentation images, etc. According to Siegfried Jäger, objects are understood as the conditions and results of sensory human activity, thus allowing Foucault to depart from a narrowing understanding of discourse as a solely language-oriented activity.[31] These tools and methods are termed by Jäger as "objectifications" or "materializations" (*Vergegenständlichungen*).[32] A dispositive consists of discursive practices (discussing with others, reading a label, etc.), non-discursive practices (standing in front of an exhibit, looking at it, walking through corridors, etc.), and objects/materializations (vitrines, walls, museums, etc.). The collective interplay or the disposing of these elements is called, according to Jäger, dispositive.[33] In other words, an object such as a display in an exhibition, or an installation is not a dispositive *per se*, but *becomes* a dispositive when paired with an institution (the museum) and a social activity (art viewing, conversing, and writing about art). In this respect, the process of observing is also not sovereign but rests upon the specific material and spatiotemporal conditions, which *allow* for such an image on display to be seen and potentially comprehended within a specific nexus of power/knowledge.

Thus, a "dispositive is a far more general case of *episteme*", since it goes beyond language, thus "the episteme in contrast to the dispositive in general, which is discursive and non-discursive, and whose elements are a lot more heterogeneous, is a specifically discursive dispositive".[34] And although Foucault does not say in what empirical relationship discourses and things and/or events/reality are linked to one other, he maintains, that the

dispositive has “a primarily strategic function”.[35] Strategic, in this regard, means that the interplay of speech, non-discursive practices and objects/materializations address a specific need people have to allocate meaning to things and vice versa, a need to be perceived as individuals through such an anchoring to things.

The notion of the dispositive designates precisely this set of material/technological and specifically temporal conditions - what can be termed here as visible material enunciations, which account for the shaping of different notions of the self within a specific historical setting. In this regard, subjects are the successful or failed *effects* of an exhibition, which is understood as a dispositive. This can be said too for the partially unsuccessful reception of “Les Immatériaux” by the contemporaneous public, accustomed as they were to the classical viewing habits of the white cube.

In the end, a dispositive analysis can be seen as an inquiry into how variables (the spectator, the object of the spectator’s viewing, and the context of the viewing practice) evolve with respect to each other. In line with Panagia’s and Jäger’s insights, Karen Barad also contributes to the novel method of dispositive analysis (although she does not point out the conceptual difference between an apparatus and a dispositive) while maintaining that,

> apparatuses are particular physical arrangements that give meaning to certain concepts to the exclusion of others; they are the local physical conditions that enable and constrain knowledge practices [...]; they are productive of (and part of) the phenomena produced; they enact a local cut that produces "objects" of particular knowledge practices within the particular phenomena produced.[36]

This materialist-performative understanding of the dispositive has major implications regarding the notion of the work of art. According to Barad,

> ‘Things’ don't preexist; they are agentially enacted and become determinately bounded and propertied within

> phenomena. Outside of agential intra-actions, 'words' and 'things' are indeterminate.[37]

In this regard, a work of art and its interpretations are constituted as part of this encounter, which in itself "is made possible through specific material practices." [38]

Returning to Lyotard, one can detect conceptual similarities between the materialist agential intra-actions of the Foucauldian dispositive and Lyotard's notion of "interaction"[39] that aims not only at destabilizing identities but also at exposing the postmodern subject, which is utterly intertwined, if not constituted by technology's logic often expressed in cybernetic terms. What Lyotard calls, "the capacity to intervene instantaneously in the object's behavior" is exemplified in the cybernetic feedback loops that sustain the immediate interaction with computational machines, for instance, what "allows a composer to intervene in the production of synthesized music as it is listened to," describes the performative self-constitution of the subject.[40] The curatorial program of "Les Immatériaux" was to make the viewer experience this foundational principle of the postmodern (and for Lyotard, utterly capitalist) condition since intra-actions constitute real-time effects, in which performativity and paralogy in language games – the main aspects of the postmodern condition as this has been exemplified in Lyotard's bestseller – come to the fore.[41] Media, and in this regard, exhibitions – understood as dispositives – are not the anthropomorphic "extensions of man" (Marshall McLuhan); rather, human beings are part of the mediatic processes, transformations, and events, which make up media. The study of the exhibition's display logic provides the theoretical means to assess in what ways all sort of displayed artifacts constitute reality-producing events and processes of meaning-making, which have been acquired by the socially embedded and technologically enhanced performative agencies of the observer/performer. Lyotard calls the exhibition an "auto-identificatory visual machine"[42] in which formal arrangements clearly indicate that the visitor is also part of the exhibits. Disposition, arrangement, movement, and the contingency of the encounter are open-ended features of the exhibition's reception based on the multiplicity of routes to be taken through the

exhibition. This dictates that the postmodern subject loses their traditional position of domination over the exhibits (the vista at the white cube) and is thus exposed to far-reaching changes in modalities of perception that affect their social, political, and individual identity. In effect, Lyotard's conclusions from these reflections serve to bring the viewers closer to the consequences for their own living context and is a figure of thought that also plays a role in postmodern knowledge.[43]

The construction of the human subject as a being constituted by both language and imaging means to go beyond the logocentric emphasis of the humanities and researching both the affective and material dimensions of such an interaction between a viewer, an object, and its display context. Contributing to the image and media turn in humanities, the conceptual anchoring of the curatorial program of "Les Immatériaux" proposed not only a highly innovative treatment of the 'exhibition medium,' in which a narrative unfolds that makes the process of exhibiting manifest -as an early project description maintains- but put forward a novel methodological approach towards the viewing subject. In line with Foucault's insights, "Les Immatériaux" addresses curatorial practices as to how subjectivities are formed, defined, and disseminated in relation to the workings of an exhibitionary dispositive. In the long run, the proposed methodology in this paper is to be understood as a museological application of a dispositive analysis, meaning the analysis of the material/signifying practices in which subjects are made up, and "visibilities" (truth/power) are constructed. "Les Immatériaux," thus, belongs to another epistemological historiography, one that also needs to be written and entails a critical genealogy of Media Art Histories and its cultural, political, and social implications analyzed from the perspective of social subjectivities produced through curatorial practices.

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2. Gilles Deleuze, *Foucault* (Minneapolis: University of Minnesota Press, 1989): 57
3. Katherine N. Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University Of Chicago Press, 1999): 1
4. Hayles, *How We Became Posthuman*, 3.

5. For the theoretical distinction between a) cultural posthumanism, a branch of cultural theory critical of the foundational assumptions of humanism and its legacy, b) philosophical posthumanism or anti-anthropocentrism, a philosophical tradition, which examines the ethical implications of expanding the circle of moral concern and extending subjectivities beyond the human species, and c) transhumanism, an ideological, pseudo-scientific movement, which seeks to develop and make available technologies that eliminate aging, enable immortality and greatly enhance human capacities, in order to overcome the human, see, Francesca Ferrando, "Posthumanism, Transhumanism, Antihumanism, Metahumanism, and New Materialisms: Differences and Relations", *Existenz* (2013), Retrieved 2014-03-14.
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7. Lyotard, "After Six Months of Work": 45.
8. Lyotard, "After Six Months of Work": 60.
9. Jean-François Lyotard, "Qui a peur des "Immatériaux"? in *Le Monde*, 3.5.1985, translated by the author.
10. In the adjoining text in the *Inventaire*, Lyotard made explicit reference to Jean Baudrillard's concept of the "simulacrum" exemplified here.
11. Antonia Wunderlich, *Der Philosoph im Museum: Die Ausstellung Les Immatériaux von Jean-François Lyotard* (Bielefeld: transcript, 2008): 122, 126.
12. Lyotard, "After Six Months of Work", 31.
13. 31.
14. 31.
15. 31.
16. 31.
17. 31.
18. Lyotard, "After Six Months of Work": 36.
19. At the same time, Lyotard distances himself from psychoanalytic notions of the apparatus proposed by Jean Louis Baudry and other suture film theorists, who take the existence of a libidinal subject for granted.
20. Tony Bennett, *The Birth of the Museum: History, Theory, Politics* (London: Routledge, 2013).
21. Davide Panagia, "On the Political Ontology of the Dispositif", *Critical Inquiry* 45 (Spring 2019: 715.
22. Michel Foucault, *Discipline and Punish. The Birth of the Prison* (London: Allen Lane, 1977): 26.
23. Panagia, "On the Political Ontology of the Dispositif", 718.
24. 728.
25. 726-727.
26. 728.
27. 731.
28. Michel Foucault, *Psychiatric Power: Lectures at the Collège de France, 1973–1974*, ed. Jacques Lagrange (New York: Palgrave Macmillan, 2006), 75.
29. Panagia, "On the Political Ontology of the Dispositif", 733.
30. Thomas R. Flynn, "Foucault and the Eclipse of Vision" in *Modernity and the Hegemony of Vision*, ed. D. M. Levin (Berkeley: University of California Press, 1993): 273-286.
31. Siegfried Jäger, "Discourse and knowledge: theoretical and methodological aspects of a critical discourse and dispositive analysis" in *Methods of Critical Discourse Analysis*, ed. Ruth Wodak and Michael Meyer (London: Sage, 2001), 40.
32. Jäger, "Discourse and knowledge", 38.
33. Jeffrey Bussolini discusses the etymology of dispositif from the Latin *dispositio* and shows how it relates to the verb *dispono* that "concerns placing here and there, setting in different places, arranging, distributing (regularly), disposing; it also addresses specifically setting in

order, arraying, or settling and determining (in military or legal senses)", Jeffrey Bussolini, "What Is a Dispositive?" *Foucault Studies* 10 (Nov. 2010): 96.
34. 40.
35. Michel Foucault, "The Confession of the Flesh," in *Power/Knowledge: Selected Interviews and Other Writings, 1972–1977*, ed. Gordon (New York: Pantheon, 1980), 120.
36. Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Durham, North Carolina: Duke University Press, 2007), 147.
37. Barad, *Meeting the Universe Halfway*, 150.
38. 148.
39. Lyotard, "After Six Months of Work", 37.
40. 38.
41. Lyotard's discussion of the exhibition's mise-en-scene drawns from his analysis of modern and postmodern urban spaces, or the "the nebula of conurbation" to be more precise, and most specifically, from Paul Virilio's text, "Une ville surexposée". Virillio argues, that with the passage to the absolute speed of present-day telecommunications, our focus shifts from space to time and, ultimately, to light, to the electromagnetic waves that permit the interactivity of space and time. Electromagnetic proximity (simultaneous and instantaneous), informational networks and "telaction" contribute to the emergent representational paradigm, which Virillio terms an "aesthetics of disappearance" closely linked to an understanding of the virtual as a guiding principle of both the postmodern city and the information society. Virillio's understanding of the urban space accounts however, not only for the specific scenographic concept of "Les Immatériaux", but also for re-thinking the dispositive of the exhibition as such, which, according to Lyotard should not be considered "an exhibition [exposition], but a surexhibition [surexposition]", clearly designating its conceptual character. Lyotard, "After Six Months of Work", 55.
42. Lyotard, "After Six Months of Work", 47.
43. Wunderlich, *Der Philosoph im Museum,* 121.

Visualising Sound Waves: Complex Media Art and Chladni Patterns

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ABSTRACT

Ernst Chladni's 18th-century discovery of the visualization of wave movements in the form of the so-called Chladni's sound figures still fascinates viewers today. Hans Jenny's subsequent experiments in the 1960s with electronically generated sounds and different materials, e.g., in liquids, also attracted significant attention and led, among other things, to new forms that sometimes had a psychedelic character, and also influenced various artists. This article examines how and under which conditions, Jenny's experiments were taken up by Alvin Lucier in the early 1970s for a sound art composition. In addition, two different ways of dealing with Chladni's sound figures in a contemporary manner in the first half of the 2000s are analyzed – one is oriented towards minimalist aesthetics, while the other belongs to the realm of bio-art with a subversive tendency. To round off the discussion, a perspective of the current possibilities of digital fabrication for the creation of Chladni sound artworks is provided.

KEYWORDS

Chladni, Media Art, Sound Art, Cymatics, Digital Fabrication

Introduction

Ernst Chladni's 18th-century discovery of the visualization of wave movements in the form of the so-called Chladni's sound figures still fascinates viewers today.[1] Hans Jenny's subsequent experiments in the 1960s with electronically generated sounds and different materials, e.g., in liquids, also attracted significant attention and led, among other things, to new forms that sometimes had a psychedelic character, and also influenced various artists.[2] This article examines how, and under which conditions, Jenny's experiments were taken up by Alvin Lucier in the early 1970s for a sound art composition. In addition, two different ways of dealing with Chladni's sound figures in a contemporary manner in the first half of the 2000s are analyzed – one is oriented towards minimalist aesthetics, while the other belongs to the realm of bio-art with a subversive tendency. To round off the discussion, an outlook of the current possibilities of digital fabrication for the creation of Chladni sound artworks is provided.

The paper begins with a short overview of the history of the sound figures from Chladni's discoveries to Jenny's experiments, which is helpful for a cultural-historical analysis of the selected artworks. Due to the interdisciplinary subject, different research areas must be taken into account—in addition to visual studies, the history of sound waves and music is also significant. Although the selected works have already been studied by researchers such as Christopher Cox and Inge Hinterwaldner, among others, a more detailed comparison of the different art positions as shown in our paper has not been provided in the literature to date.[3] With such a comparative perspective, the various symbolic connotations of Chladni's sound figures become clear.

From Chladni's Sound Figures to Hans Jenny's Cymatics

The sound wave research of Ernst Chladni (1756–1827) has a prehistory that goes back to individual observations by Leonardo da Vinci and Galileo Galilei.[4] Chladni took up a later finding by the English scientist Robert Hooke (1635–1703), who noticed knot patterns associated with the vibrations of a glass plate containing flour caused by a violin bow on 8 July 1680.[5] Chladni

was able to produce different patterns for different pitches by striking a violin bow against a thin metal plate with sand sprinkled on it. Chladni called them "sound figures" ("Klangfiguren") and published them as abstract patterns without any depth effect for the first time in *Discoveries in the Theory of Sound* (*Entdeckungen über die Theorie des Klanges*, 1787) and later in his famous book *Acoustics* (*Die Akustik*, 1802).[6] He also displayed the sound figures experiment at public lectures in different European cities, which became very popular. The German Romantics were also interested in these experiments because the sound figures seemed to attest to the hidden order and harmony of nature. Novalis, for example, associated them with the "cypher-writing" ("Chiffrenschrift") of natural forms.[7]

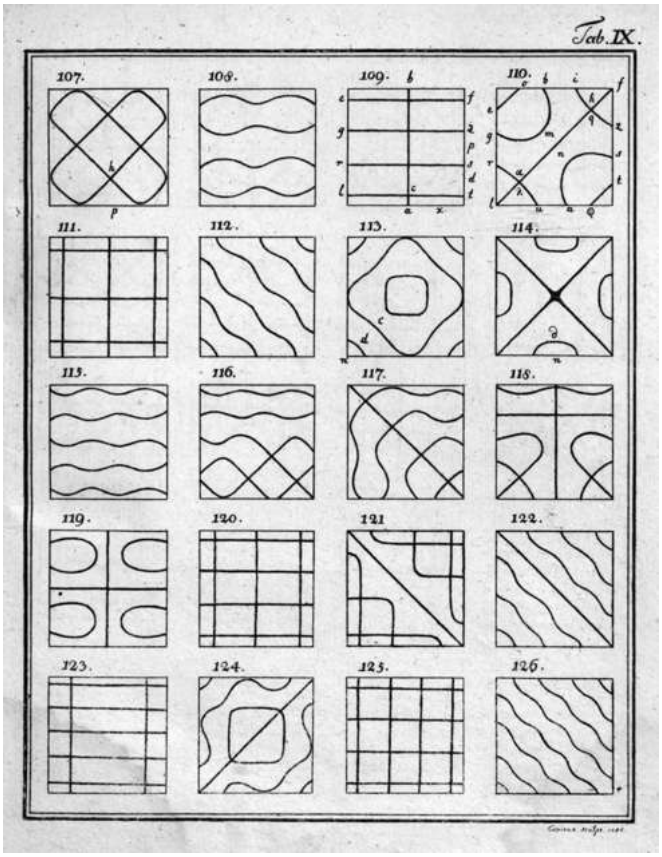

Fig. 1. Ernst Chladni's Sound figures (*Entdeckungen über die Theorie des Klanges*, 1787, plate 9)

The phenomenon of Chladni patterns was explored by other mathematicians and physicists in subsequent decades and the scientific images showing the patterns generated became more detailed and realistic with time. In 1885, the Welsh singer Margaret Watts-Hughes (1842–1907) invented a device called an *eidophone*.[8] This device allowed her to create flower- or tree-like patterns with colored liquids using the sound waves produced by her voice. The *eidophone* inspired Henry Holbrook Curtis (1856–1920) to use a very similar device to experiment with singers' voices but which used sand as Chladni did. He called this device a "tonograph" and intended to use it to train singers.[9] However, as other media (e.g., phonograph records with the auditory reproduction of sound signals) were more successful at the time, he did not pursue this further.

In the 1960s, Hans Jenny (1904–1972), a Swiss doctor and amateur physicist, again used the tonograph for voice experiments but named it tonoscope. In his opinion, the tonoscope had the potential for speech education for the hearing-impaired.[10] However, with time, better technical opportunities for such voice training became available and cochlear implants became more widespread. Jenny used modern electronic devices for creating and documenting Chladni sound figures and also incorporated various materials such as quartz sand and powder as well as various membranes and liquids into his experiments. With frequency and vibration generators and piezoelectric amplifiers, a wider range of frequencies could be made visible.[11] Hans Jenny introduced the term "cymatics" to describe the study of visible sound vibrations and was influenced by Rudolf Steiner's esoteric anthroposophy.[12] According to Jenny, all forms in the universe are caused by an invisible vibrational force that becomes visible in cymatics. The photos of Jenny's experiments attracted a lot of attention because the soundwaves in liquids had a deeper three-dimensional effect than the earlier illustrations of Chladni sound figures on plates. In addition, they showed very unusual shapes reminiscent of lunar landscapes. The special psychedelic-like aesthetics of his experiments suited his time and the contemporary New Age movements.[13]

Alvin Lucier's *The Queen of the South* – Cymatics and Sound Art

Strongly influenced by John Cage, Alvin Lucier (1931–2021) explored the nature of sound in his groundbreaking experimental compositions and drew inspiration from the work of renowned physicists.[14] For his 1972 work *The Queen of the South*, however, he also demonstrably drew on the experiments of Hans Jenny. In a short score written in prose, Lucier outlines an open process arrangement.[15] The performers are to produce different sound patterns on various solid bodies and the sound produced by voices or microphones can amplify instruments. For his own performances, Lucier, like Jenny, preferred sine oscillators as a sound source because the sound figures were easier to produce with long continuous tones.[16]

Fig. 2. Alvin Lucier, Queen of the South, setup (picture credit: Thoben, "Look at the Natural World," 111).

For creating the sound figures, Lucier recommends several materials that are clearly inspired by the ones used by Jenny.[17] To guide the performers, Lucier also provided many image associations such as lattices or spirals

influenced by Jenny's experiments.[18] This clearly shows that Lucier's focus in *The Queen of the South* is not on the sounds but rather on the creation of the images.[19] A collective image should emerge, and details of such an image should be projected enlarged onto monitors.

As the conditions for performances of experimental sound art pieces are usually not as ideal as they were in Jenny's experiments, it was challenging to create the images in *The Queen of the South* and they are normally not so good, clear, or precise as those in Jenny's experiments.[20] However, it can be seen as an advantage that the video shows all stages of the forms on a bigger scale, also the intermediate stages that show imperfect patterns, or the stages with no patterns that are generally not represented in the illustrations of Chladni sound figures.

In Lucier's *The Queen of the South*, video projection is very relevant to the composition's central topic of transformation. Thus, sounds are transformed into sound figures. Sometimes there is also a preceding electronic amplification of the sounds of humans or musical instruments and then the mechanically generated visual phenomena are transformed into two-dimensional vertical electronic video images.[21] Lucier preferred to show enlarged details on the video screens.[22] For Lucier, the topic of transformation has alchemical connotations, which is why he chose the title *The Queen of the South*.[23] While seeming cryptic at first glance, this term refers to the New Testament name for the Queen of Sheba which was also associated with the allegory of wisdom.[24] In alchemy, she also embodies the divine power to bring about transformation, and her transformative substance is also seen as an image for the macrocosm according to psychoanalyst Carl Gustav Jung's study *Psychology and Alchemy* (1944) read by Lucier while working on *The Queen of the South*.[25] Fittingly, the early performances were also attributed to a special and very intense atmosphere that seemed almost religious and suited Lucier's alchemical celebration of natural mysteries.[26]

Lucier's work *The Queen of the South* thus brought cymatics into the realm of sound art at the beginning of the 1970s, which was made possible because music performance and progressive art practice converged during this period. As Lucier used contemporary technologies such as loudspeakers

and closed-circuit TV for his performances, his work is considered a precursor for the preoccupation with sound figures in the fand yields of media arts.[27] Although the unusual nature of the performances with their reduced musical events was challenging for the audience, they were nevertheless accepted by them which probably has to do with the general fascination caused by the transformation of sounds into sound figures.[28]

Carsten Nicolai's *Wellenwanne* (Engl. *Wave Tub*) and *Milch* (Engl. *Milk*) – The Poetry of Minimalist Aesthetics Combined with Scientific Experiments

Fig. 3. Carsten Nicolai, *Wellenwanne (Engl. Wave Tub),* 2000 (picture credit: Carsten Nicolai, *Static Fades*, 19)

Carsten Nicolai's (*1965) use of cymatics in two of his works from the early 2000s is far more precise and appears more scientific than Lucier's. Unlike Lucier, this German artist did not use solid surfaces and strewn materials, but liquids, which received greater attention in the context of a visual representation of sound waves based on Jenny's experiences. In particular,

Nicolai concentrates on lower frequencies that are inaudible or less audible for humans. The first work titled *Wellenwanne (Engl. Wave Tub,* 2000*)* consists of four flat aluminum trays that are filled with water and rest on speakers which play low sinus frequencies that cause the water to move.[29] The resulting play of patterns in the water invites the viewer to reflect on the alternation of chaos and structural order.[30]

Nicolai's second work titled *Milch* (Engl. *Milk*, 2000) consists of a ten-part photo series (each 80 x 66 cm).[31] Nicolai photographed vibrations of certain frequencies ranging from 10 to 110 Hz in milk. The patterns taken from above become smaller and smaller with higher frequencies – a phenomenon pointed out by Ernst Chladni and Hans Jenny.[32] The *Milk* series photos were presented together with the *Wave Tub* in several exhibitions.[33] Visitors were thus encouraged to look more closely at the rapidly changing patterns in the *Wave Tub,* as the *Milk* photographs freeze a specific moment and show a specific pattern in detail.

Because Nicolai chose milk as the liquid, the pattern contours created in the bluish-gray liquid by the sound waves are visually similar to the early graphics of Chladni's sound figures with their white ground, but at the same time have more depth than these early figures. On the one hand, while Nicolai's photographs resemble the documentation of a series of experiments,[34] they are far more appealing as they are also presented like art photographs in a larger format with finer print quality. The more abstract forms do not immediately make us think of milk like some photos with drops in Jenny's *Cymatics* do.[35]

While *Milk* as the title might be surprising for viewers and the photos seem enigmatic at first glance in terms of their content and aesthetics, they are actually more akin to minimalist painting. Significantly, Nicolai visualizes sounds that are not (or barely) audible for humans. The photographs thus seem to continue John Cage's famous exploration of silence, although Nicolai does not focus on ambient sounds but rather on limited human perception.[36] Very fittingly, Nicolai has chosen a white liquid to represent the barely perceptible sounds because white can be seen the visual equivalent of silence. For instance, Robert Rauschenberg's *White Paintings* are considered a fitting

visual counterpart to Cage's thoughts on silence.[37] The special aesthetics and the art-historical references were probably also decisive for Gerhard Richter (born 1932) to select Nicolai's photographs as models for two paintings and two color serigraphs in 2004.[38] Richter, however, does not use *Milk* as the title, but *Abstract Painting (Skin)* (German original: *Abstraktes Bild (Haut)*). This change of title is also possible because of the abstract nature of Nicolai's photographs, which offers several possibilities of association.

More than a decade later, Nicolai created another wave pool for the *Echigo-Tsumari Art Triennial* in 2012. He added the acronym *lfo* to the title *Wave Tub* (*Wellenwanne*), which stands for "low-frequency oscillator." [39] The installation consists of a more complex wave tub into which a stroboscope has been integrated. Soundwaves from a two-channel composition generate interference patterns that are made visible on a screen. Nicolai's experiment is common from physics lessons but was now transferred on a large scale into the exhibition space.[40]

Although Nicolai is not religious, he believes that nature is based on a "master plan" and wants to visualize various facets of this plan with his works.[41] This view is, of course much less esoteric compared to the reflections of Jenny and Lucier, which is also reflected in the cool and clinical character of Nicolai's works – especially in comparison to those of Lucier. Nicolai's experimental arrangements are much more controlled and thus the resulting sound figures are very precise and symmetrical.[42] While his experiments and their photographic documents in the exhibition space increase the level of interest in a physical worldview, they can also be perceived poetically as, according to Christoph Cox, they would invite one to think about the vibrational dynamics that animate matter.[43]

Roland Maurmair's *Club Moss Field Generator* – Sound Figures and Critical Bio-Art

The Austrian artist Roland Maurmair (*1975) was also inspired by Chladni's sound figures and he created a *Club Moss Field Generator* (*Bärlappfeldgenerator*) for an exhibition in Linz in 2005.[44] Like Lucier, he works with solid materials and, in this case, sound figures are formed using

tiny club moss spores – the Latin term for them is *lycopodium* – on a membrane stretched over a substructure with several loudspeakers. Visitors can speak or sing into two microphones that hang above the construction and are also connected to the loudspeakers. This participatory involvement of the visitor is a novelty compared to the work of Nicolai or Lucier. By playing sine frequencies when the visitors do not activate the microphones, the visitors become aware of the differences between individually generated sounds and the pure tones—especially with the self-generated sounds, the sound figures are more unusual.

Fig. 4. Roland Maurmair, *Club Moss Field Generator* (*Bärlappfeldgenerator*), 2005 (picture credit: Maurmair, *Nature's Revenge*, 35).

Maurmair's interactive installation refers to the earlier eidoscope/tonograph by Margaret Watts Hughes and Holbrook Curtis from the end of the 19th century mentioned in the first part of this paper.[45] They were also taken up by Hans Jenny, who, in contrast to his earlier experiments, had not yet integrated any newer electronic technology into his tonoscope replicas, whereas Maurmair now incorporates microphones and loudspeakers.

Through the title *Club Moss Field Generator*, Maurmair highlights the strewn club moss spores that he used on the membrane and Chladni already used that in addition to sand for experiments. The work belongs to a series that bears the name of the botanical classification, namely the cryptogams.[46] They are non-flowering or secretly flowering plants. For Maurmair, this also has a symbolic meaning on a political level. In a 2005 interview, he emphasized that those who act in secret, like the cryptogams, can infiltrate the system and the apparatus and thus become dangerous.[47] In his installation, the sound figures made of club moss spores enable the enrichment of perception in "a society heavily influenced by media and surveillance"[48] and encourage the visitor to think about individual vs standardized sounds, artificially produced sounds, and subversive strategies. Due to the special connotation of the material used, Maurmair's installation can be classified as bio-art and is more socially critical than Nicolai's works. Because of the connotation of the club moss material and its participatory character, it is a unique and impressive work that is simultaneously the least esoteric of all the works presented.

Experiments with 3D Chladni patterns

With the advent of digital fabrication technologies, creating three-dimensional representations of Chladni patterns have become more accessible. Several 2D mages of Chladni sound figures can be combined into a 3D model, which can then be fabricated, as done by Dutch Designer Ricky van Broekhoven with the *Soundshape Speakers* (2013).[49] In some of our previous works, we experimented with creating three-dimensional representations of Chladni patterns in an educational setting. 2D Chladni patterns were created, transformed into 3D models, which were fabricated

and assembled into a collective sculpture called the *Chladni Wall.*[50] This *Chladni Wall* transfers the collective image created in Lucier's *The Queen of the South, so to speak,* into the 21st century and translates it into a permanent 3D artwork. Significantly, the individual style of each student is preserved even more powerfully in the single bricks.[51]

In 2016, an approach to transfer Chladni's sound figures to the third dimension was introduced by a research group at Freie Universität Berlin.[52] It is explored further in one of our current works,[53] but a great deal remains to be discovered and supported concerning the potential of 3D Chladni works in the field of visual arts as art and science crossovers and collaborations.[54]

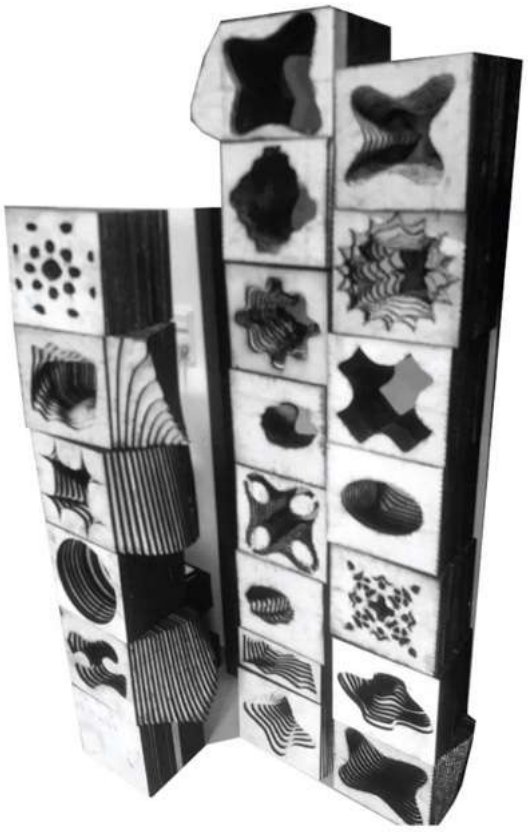

Fig. 5. Anca-Simona Horvath and students from Aalborg university, *The Chladni Wall*, 2020 (picture credit: Horvath and Rühse, "The Chladni Wall," 5).

Conclusion

Although the *Chladni Wall* captivates with its particular sculptural style, it, of course, does not offer the viewer the opportunity to experience the direct relationship between the acoustic signals and the visual forms as in Lucier's *The Queen of the South*, Nicolai's *Wave Tubs* and Maurmair's *Club Moss Field Generator*. The "archaic indexicality" distinguishes the Chladni sound figures created in these pieces from other sound visualizations in the field of visual music.[55] Like Chladni's own presentations of his experiment in the 18th century, live experiments with sound figures still draw a lot of attention because one can experience "tone painting in its most literal sense" (Roland Maurmair).[56] The experiments of Hans Jenny were especially inspiring for those working with sound figures in sound art, largely because of his use of liquids and contemporary technical devices. Lucier was one of the first artists to be inspired by Hans Jenny's work during an important era of change and turned away from several traditions in his piece *The Queen of the South*, especially by allowing an open-ended process.[57] The patterns created in this work are more imperfect than those of Jenny, as the conditions are less ideal in performances. The alchemical connotation of the transformation of the image sections into video images in Lucier's piece is also very special.

At the turn of the millennium, art in conjunction with science attracted more attention, and Carsten Nicolai was one of the artists who worked with Chladni's sound figures in this context. Nicolai worked with low frequencies to reflect on silence. Like Jenny, Nicolai used liquids but renounced using esoteric connotations. His artworks are characterized by a restrained minimalist aesthetic that deals with the properties of sound in a poetic way.[58] Roland Maurmair worked with sound waves in solid materials in an installation—his *Club Moss Field Generator* belongs to the bio-art genre and is a participatory artwork with a subversive character. It has parallels to the eidoscope device invented by Margaret Watts Hughes, although modern technology is applied in this case. For some years now, 3D Chladni visualizations can be created more easily. We made an experiment where we tried to transfer sound images into 3D representations. However, there is still a lot of undiscovered potential of 3D Chladni sound figures in the field of

visual arts and the aesthetics and the symbolic connotations of future Chladni sound figures will be interesting for research.

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Endnotes

1. Chladni first published the sound figures in 1787 in his book *Entdeckungen über die Theorie des Klanges* [Discoveries in the Theory of Sound] (Leipzig: Weidmanns Erben & Reich).
2. Jenny, *Kymatik*; Cox, "From synapse to signal," 14.
3. Cox, "From synapse to signal;" see also Hinterwaldner, "Audiovisual tensions."
4. Leonardo da Vinci, *Notebooks*, 542; Galilei, *Diaologues*, 101.
5. Hooke, *Diary*, 448 (entry of July 8, 1960).
6. Chladni, *Theorie des Klangs*; idem, *Die Akustik.*
7. Novalis, *Werke*, 95; Lydon, "Signatura rerum."
8. Watts Hughes, *Voice figures*.
9. Curtis, "The Tonograph;" idem, *Voice building*, 233-238.
10. Jenny, *Cymatics*, 63-64.
11. Blamey, *Sine Waves,* 209.
12. Hans Jenny used "Kymatik" [Cymatics] for the title of his book project; Stuten, "Foreword," 15.
13. Cox, "From synapse to signal," 14.
14. Lucier, "Origins of a Form," 5.
15. Alvin Lucier, The Queen of the South for Players, Responsive Surfaces, Strewn Material, and Closed-circuit Television System (1972). – The score is printed in Lucier and Simon, *Chambers,* 94-95; see also Nyman, *Experimental Music*, 105.

16. Lucier and Simon, "Interviews with Douglas Simon," 148-50; see also Blamey, *Sine Waves*, 208.
17. Lucier and Simon, *Chambers*, 94-95; Jenny, *Cymatics*, passim.
18. Lucier and Simon, *Chambers*, 94-95.
19. Ibidem, 94; see also Wilson, "Interview with Alvin Lucier," 2.
20. Lucier, "Origins of a Form," 8.
21. Thoben, "Look at the Natural World," 113.
22. Ibidem, 114.
23. Lucier, Origins of a Form, 11.
24. Jung, *Psychology and Alchemy*, 367.
25. Idem., pp. 386–387, see also Thoben, "Look at the Natural World," 114.
26. Johnson, "The Minimal Slow-Motion Approach."
27. Cox, *Sonic Flux*, 186f.
28. See for instance Johnson, "The Minimal Slow-Motion Approach."
29. Carsten Nicolai, *Wellenwanne* (Wave Tub), 2000, aluminium trays, cd player, cd, amplifier, loudspeakers, water, variable size, see also Somaini, "Catching the Waves," 59.
30. Hollein, "Forword," 21.
31. Carsten Nicolai, Milch (Milk), 2000, 10 Hz, 20 Hz, 25 Hz, 40 Hz, 50 Hz, 55 Hz, 75 Hz, 80 Hz, 95 Hz, 110 Hz, lambda print face mounted to plexiglas, 80 x 66 cm each (images are published in Carsten Nicolai, *Static Fades*, 12-17). – See also Hasegawa, "Snow," 44, and Somaini, 2005, 59f.
32. See for instance Jenny, *Cymatics*, 35.
33. See the installation view in Hollein and Modelsee, *Anti Reflex,* 92-93.
34. The *wellenwanne* installation is also presented as a test arrangement – see Koepnick, *Resonant Matter*, 92.
35. Hans Jenny, *Cymatic experiments with liquids*, 1960s, photo: H. P. Widmer, published in UNESCO 1969, 3.
36. Cage composed a "piece of uninterrupted silence" with his famous composition *4'33"* – Revill, *Roaring Silence*, 205/452 [eBook].
37. Robert Rauschenberg, *White Painting* [three panel], 1951, San Francisco Museum of Modern Art, oil on canvas, 182.9 x 243.8 cm; see Revill, *Roaring Silence*, 205/452 [eBook], and Kauffman, "The 'Theory of Silence,'" 4.
38. See Gerhard Richter, *Works on Paper*, 16-17.
39. Carsten Nicolai, *wellenwanne lfo*, 2012, metal, glass, acrylic glass, mirror, audio equipment, water, light, sound, room installation, dimensions variable; see also Koepnick, *Resonant Matter,* 93.
40. See wave tub with stroboscopic LED lighting, equipment for teaching physics in school, Cornelsen, accessed May 1, 2022, https://cornelsen-experimenta.de/shop/de/Sekundarstufe/Physik/Demo-Sets/45740-Wellenwanne+mit+stroboskopischer+LED-Beleuchtung.html.
41. Haglund, "The air between the planets," 28.
42. Hollein, "Forword," 21.
43. Cox, "From synapse to signal," 17.
44. Roland Maurmair, *Club Moss Field Generator* (*Bärlappfeldgenerator*), interactive installation, 2005, club moss spores, subconstruction, membrane, microphone, PC; see also O.K. Centrum, *Ordnung der Natur*, 62-65.
45. Hinterwaldner, "Audiovisual tensions," 207.
46. Maurmair, *Nature's Revenge*, 27.
47. Ibidem, 38.
48. Ibidem.
49. Horvath and Rühse, "Chladni Patterns Gone 3D," 320 (with illustration).
50. Horvath and Rühse, "Chladni Wall."
51. Ibidem, p. 5

52. Skrodzki, Reitebuch, and Polthier, "Chladni Figures."
53. Eskildsen and Horvath, "Sonic Coexistence."
54. An introduction on Chladni 3D patterns in the fields of visual arts and design can be found in: Horvath and Rühse, "Chladni Patterns Gone 3D."
55. Somaini 2005, p. 59.
56. Roland Maurmair, *Nature's Revenge*, 34.
57. Nyman, *Experimental Music*, 105.
58. Borthwick, "Milch, 2000," 201.

Digital Migration of Generation X and Eco-techno Utopia: The Case of Novi Sad New Media Scene

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ABSTRACT

The Information Age focuses on scientific and artistic research on the feedback loops between individuals, social systems, mechanical systems, and the global ecosystem. This paper analyses the digital migration of Generation X and the preconditions of the emergence of a new media scene in Novi Sad (Vojvodina/ Serbia) which had evolved in a state of extreme social complexity—the constitutional breakdown of SFR Yugoslavia and the effects of the Yugoslav wars causing the downturn of political, economic, cultural, artistic and moral values of the society. The research was focused on eco-techno utopia and differentiation of regional identity within the perspectives of the Anthropocene culture (1800–). The outcome was a chronological map of site-specific media art history which took into account the personal epistemology of an artist which had been formed in a volatile environment, specifically: 1) *Autopoiesis* of the artist and construction of identity through the process of adapting to the environment, *Physical–Virtual*; 2) Simultaneous adjustment to the complexity of the environment and artist's complexity; 3) Generation X augmentation with the products of the information-based economy; 4) Emergence of information art in Novi Sad, e.g., environment art, tactical media, computer art, digital art installation, glitch art, software art, Internet art, and gaming.

KEYWORDS

Site-Specific Media Art History; Post-Yugoslav New Media; Environment Art; Eco-Technologies; Artist's Perspective

Introduction

The province of Vojvodina was formed as a legal administrative body after World War II. The dynamic socio-cultural development of Yugoslavia, colloquially called the *Belle Époque* (1957– 1988), was a period of peace and industrialization within socialist democratic centralism based on a delegate system and the "International Covenant on Civil and Political Rights," which included economic and cultural equality but without equality of "political or other opinion." The *Belle Époque* timeline began with the extinguishment of the labor camp Goli Otok (1956), and the relaxation of Agitprop policy by *separation of the cultural front from the ideological front* (1957). It lasted until the Anti-Bureaucratic Revolution (1988), which had been induced at the provinces Vojvodina and Kosovo, as well as the Republic of Montenegro, followed by the outburst of nationalism, political repression and economic downturn.

This paper is a primary documentation of an artist. A digital migration of Generation X was given as the milestone events organized in order as an actor on the scene had perceived it. The interpretation of the situation was made from the perspective of an artist passing through the political dismantlement of Vojvodina autonomous rights (1988–1990), the Yugoslav wars (1991–1999), the international isolation and economic sanctions on SR Yugoslavia (1991–1995), the advent of the Internet in Serbia (1996), the globalization and the latter evolutionary leap to the state of *posthuman* due to the penetration of mobile telephony (2013–).

The Conjuncture 1957-1988

The city of Novi Sad (*lat.* Neoplanta, *hu.* Újvidék, *sl.* Nový Sad, *de.* Neusatz an der Donau, *sr./hr./ro.* Novi Sad, *abbreviation* NS) is the cultural and political center of Vojvodina, northern Province of the Republic of Serbia, situated in the Pannonian Plain. The Province of Vojvodina is one of the largest hydro-systems in Europe that has been built from the beginning of 18th century. It was developed under the auspices of different states and economic systems: the Austrian Empire, the Dual Monarchy Austria-Hungary, and the Socialist Federal Republic of Yugoslavia (SFRY). Massive

hydro-technical works, the colonization motivated by political goals of Austrians, Hungarians and Serbs, and the economic migrations of various Central European and Balkan nations, generated a cultivated habitat. It is the site of European hydro-technical heritage including: Great Bacska Canal (Danube–Tisza, 1802); *Lock Bezdan* (Danube, underwater concreting 1855/56); *Hydro-nod Mali Stapar* at Great Bacska Canal (Lock, 1802; Mill, 1848; monument *Goddess of Fertility Pannonia*, 1872); *Lock Becĕj* (Tisza, power plant 1895-98); *Steam pump Žabalj* (Tisza, 1898); *Diesel pump station Plavna* (Danube, 1912); and *The Hydro-complexes Klek and Itebej* (Bega Canal, 1910-1914).[1]

The closure of water management of Vojvodina was completed by the construction of the Danube-Tisa-Danube system (1947-1977) and the dam on the river Tisza (Novi Bečej, 1977). Four hundred engineers worked on the D-T-D major project that included over 1,300 studies and 35,000 graphic drawings, while 130 million cubic meters of soil was dug in order to compound the D-T-D canal network.[2] The Province of Vojvodina was a case of regional identity differentiation within the epistemology of the Anthropocene culture. Nikola Mirkov, the author of the D-T-D system wrote: *The new system of water management produced a new province, a new life, a new civilization, a new culture, and a new human*. Urbanization and colonization began in the Age of Enlightenment (18th century, the Austrian Empire) on the principles of *Physiocracy* based on the idea that *land development*—population growth (migration and colonization) and agricultural development (canal construction and drainage of wetlands)—was the main source of wealth of nations and a foundation for the development of trade, crafts and tax revenue of the state. The closure of the *D-T-D anthropocene cultural pattern* was made within the conjuncture of SFR Yugoslavia, defined by *socio-cultural patterns* such as: self-governing socialism, left-liberal progressivism, non-aligned politics, multiculturalism, brotherhood and unity.

The D-T-D system should be regarded as the most significant eco-techno-utopia project of SFR Yugoslavia, which had been built in symbiosis with cultural development of Vojvodina and economy grounded in

the light industry (*e.g.* AIK-DTD, *en.* Agro Industrial Complex Danube–Tisza–Danube based in Novi Sad). The D-T-D system had functioned as a cyber-anthropological pattern due to its socio-cultural impact. The awareness that human had managed to modify the environment with hydro-technical works so that s/he can regulate and control it, was the basis of cyber-anthropological thinking and should be considered as the foundation of the cybernetic discourse within the site-specific history of art, *e.g.* genesis and epistemology of land art projects in Vojvodina. The cyber-anthropological aspects are important to understand the influence of conjuncture on the emergence of site-specific phenomena within the context of art history. Rapid environmental change was captured in the 1960s 'informel art' from Vojvodina (Ács József, Pal Peterik, József Benes, Bogdanka Poznanović); *land art* interventions and *water art* interventions (Bogdanka Poznanović, Bosch+Bosch, KÔD); as well as at the work of the EK Group (1969–1971) which operated within the production resources of the art colony in Senta. Group EK (erőt kölcsönző) was an informal assembly that performed socially engaged multimedia works (symbiosis of fine art and applied art practices) in relation to the environment art and mass media.

An early example of a mediated image—extracted from the aesthetics of *old movies* and *old jazz*—was the "Dei Leči" *snapshot-motion-pictures actionism* made in Downtown Novi Sad by Bora Vitorac and Dragoljub Pavlov (1957-1965). The late 1960s were the expansion of mass culture, words like "super" and "image" entered the urban vocabulary of Yugoslav subculture. The Yugoslav Broadcasting was founded on November 12, 1952. The beginnings of television date back to 1958 and the founding of the Yugoslav Radio Television, whose members were regional information centers in Belgrade, Zagreb, Skopje, Ljubljana, Sarajevo, Titograd (Podgorica), Novi Sad and Pristina. By the decision of the Workers' Council of Radio Novi Sad (February 4, 1971), the working unit "Television under construction" was established with the task of infrastructural preparation for the construction of a self-financed television station, equipped to broadcast programs in several languages.[3] The first TV Novi Sad News, broadcast from Mišeluk (November 27, 1975), marked the beginning of the production of Novi Sad

television, which was of fundamental importance for the development of the local media sphere and popular music culture. TV Novi Sad art-specials were specific tactical media production, which can be treated as the "guerrilla" intrusion into the state-television worldview, such as Judit Šalgo (1941-1996) rhetorical performance *The Positions of Literature*, recorded in the studio of the TV NS news program.[4]

Since the beginning of the 1960s, according to global trends, Yugoslavia has been working on digitalizing the process of managing military, communal and economic systems. The Vinca Institute and the Mihajlo Pupin Institute developed the Yugoslav series of *CER–Digital Electronic Computer* (*sr. Cifarski Elektronski Računar,* 1960-1975). The first mainframe computer, *Honeywell–model 200*, was imported in Novi Sad in 1970, based on the "Decision on pooling funds of the Municipality of Novi Sad for the joint financing of the procurement of equipment for Electronic Computer Center" (December 27, 1968). The first *Electronic Computer Center* (ECC) in Novi Sad became operational on January 15, 1971. Also, the companies formed their own local ECCs, *e.g.* unified payment operations in the housing company of Novi Sad have been carried out since 1975, after the purchase of the *ICL – model 2903* in 1974.[5] In the context of Vojvodina neo-avantgarde, historical examples of *digital arte povera* were created from computer consumables such as the graphic interventions on computer prints of Slavko Matković *Processing of discarded computer material* (1970) and the photo-action of Bogdanka Poznanović *Computer tape & body* (1973).

The rapid development of communication networks and the globalization of the media cultural space formed a growing-up pool of Generation X. Since the 1980s; experimental video expression has dominated an image of popular music, e.g. David Bowie's *Ashes To Ashes* (1980). Television as a creative media was challenged by the long-awaited apocalyptic 1984, which began with the first satellite installation, Nam June Paik's *Good Morning Mr. Orwell* (1984). TV program was broadcast live from studios in America, France, Germany and South Korea. Paik opposed to the dystopian view that television contributes to alienation and destroys people's intimacy, and opted for the utopia of global communication. He combined different

visual sensibilities and musical genres into a unique syncretic installation, which influenced the polygenre telematic thinking of Generation X.

Yugoslav multimedia was based on the formula TELEVISION + MUSIC + COMICS = MULTIMEDIA. An urban media image had been "liberated from the Balkan complex."[6] It was shaped by punk and new wave music scene (Belgrade, Zagreb, Novi Sad, Rijeka, Ljubljana) and by the young authors of comics (*e.g. Novi kvadrat*, Zagreb). In Novi Sad, the first punk single was "Being Ugly, Smart and Young" (1979), by the group Pekinška Patka (*en. Beijing Duck*), which held the concert at the shop window "Live at NORK" (Novi Sad, 1979) and defined the new image of "Punk with a diploma."[7] From the beginning of the 1980s through the 1990s, Novi Sad post-punk music scene (Imperium Of Jazz, Luna, La Strada, Boye, Obojeni Program) was a cacophony of music, poetry, performance and the visual arts strongly influenced by the 1970s neo-avantgarde artists such as Branko Andrić-Andrla (Imperium Of Jazz) and Slobodan Tišma (KÔD, (∃-KÔD; Luna, La Strada). Electronic music and post-industrial multimedia marked the 1980s in Vojvodina. In 1984, group Autopsia from Ruma created a digital work *IkkONA* on *Spectrum*, the posters *Economy of Death* (1981-85), and released the album *Factory* (1989): "There is only one formal attribute of meaning for post-industrial art: repetition! No progress! No development! Everything is the same. Every difference is the same. New differences are the repetition of old differences. And so on."[8] Group Rascep from Zrenjanin introduced voice-performative expression, music performances that included visuals and vocalization in a "new" fictional language. The representatives of Novi Sad multimedia scene were schoolmates REX Ilusivii (electronic music) and Zoran Janjetov (comics). Unique Novi Sad music phenomena, and the first Yugoslav female band Boye—"I'm Joyful" (1983) and "Coffee at the Bottom of the Ocean" (1983)—announced the alternation of the melancholic micro-world of the 1980s, to the technologically driven dynamism of the 1990s, e.g., single "Ludilo mašina" (*The madness of machines*, 1997), a music video directed by Aleksandar Davić.[9]

During the 1980s, IT cabinets were formed in Yugoslav primary and secondary schools. IT literacy was propagated via specialized magazines (*World of Computers*, *Galaxy*), TV shows (*Computer School*) and radio shows (*Polarotor*), which gave impetus to the development of school and home computers in Croatia, Serbia, Vojvodina and Slovenia. Novi Sad-based Company *Novkabel*, Electronic Computers Department, manufactured a personal computer *ET-188*; and a conference communication BBS system was established for the 29th Chess Olympics (Šonsi, Novi Sad, 1990). The IT consumer market flourished due to the growth of personal standard of the Yugoslav middle class. In 1983, Voja Antonić sketched the first Yugoslav home computer *Galaxy*, based on the do-it-yourself principle. In-line with Antonić's instructions published in a special issue "Computers in your home" (*Galaxy* magazine special edition, January 1984), about 8,000 people made the computer *Galaxy*. Affordable personal computers (*ZX Spectrum, C64*) became common to Generation X, that spun the market for Indie video games—the first Yugoslav publishing house Suzy Soft operated in Zagreb (1985-1988).

Electronic art penetrated the Yugoslav cultural system during the period of mainframe experimentalism by a distinctive exhibition/symposium *New Tendencies* held in Zagreb ("Tendency 4: Computer and Visual Research," 1969; "Tendencies 5: Constructive Visual Research, Computer Visual Research, Conceptual Art", 1973; magazine *Bit*). In a text on mail art in Yugoslavia, artist Bálint Szombathy situated the beginning of information-based art in the 1950s, concerning "the parafluxus objects" created by multimedia artist Vladan Radovanović (founder and head of the Electronic Studio of Radio Belgrade (1972– 99).[10] At the Academy of Arts in Novi Sad (founded in April 22, 1974), Bogdanka Poznanović introduced a methodologically innovative course "Intermedia Research" and a studio equipped for video production (1979/1980). The "Intermedia Research" was built upon Fluxus practice—as depicted in *Intermedia Chart* by Dick Higgins (19 January, 1995)[11]—thus Novi Sad label "new media" usually refers to the diachronic development of expanded media, way back to the 1960s. After a decade of stillness, electronic art renaissance occurred in the period

1989–1991, within a conjuncture of the 1980s PC revolution. The 1989 Ars Electronica (AE) featured two artists from Novi Sad, Vojin Tišma received an honorary mention in the field of computer music for the work *Marshy Sounds*, while Predrag Šidjanin participated within the cooperation-based telematic project by Roy Ascott (*Aspect of Gaia*, 1989).[12] In addition, AE honorary mention in the category of computer animation received the work *The Dream* (1989) by Franz Curk produced in the studio of RTV Ljubljana.[13] The advance of the digital art scene in Yugoslavia occurred in 1991, within the framework of the exhibition "Computer Art" held at the ULUS Gallery in Belgrade, introductory texts in the catalog were written by artists Predrag Šiđanin, Vladan Radovanović, and Miroslav Miša Savić. The "Computer Art" exhibition was meant to be an occasion to establish the Yugoslav Association of Electronic Media Artists (AUEM), but the initiative was prevented by the Yugoslav wars (1991-1999).

Yugoslavia had been part of the European Academic Network (domain co.yu) since 1989, but Serbia was disconnected from international networks due to the warmongering politics. The Academic Network of Serbia was founded in 1992. After the UN sanctions against FR Yugoslavia ended at the end of 1995, The Academic Network of Serbia was connected to the Internet on February 28, 1996. At that point international e-mail, chat, forum and specialized database services became available to the academic community in Serbia. Re-actualization of the war-torn initiative was a symposium "A Brief History of Electronic Art," held at the Rex Theater of the B92 Cultural Center (Belgrade, 1998). Gordana Novaković and Miroslav Miša Savić (Belgrade), the pioneers of Yugoslav electronic art and organizers of the event, invited regional artists active in the field of digital art in an effort to initiate the "establishment of the national collection and archives of Yugoslav new media practice." Still, for the second time, the efforts did not yield the desired result.[14] Instead, the post-Yugoslav scene became well-known for the Internet Flame Wars, e.g. implosion of the *Syndicate* mailing list[15] (The Kosovo War, 1999), and the case of Andrej Tišma, a mail-artist / net-artist, and an art critic of newspaper *Dnevnik* (Novi Sad) at the time.[16]

The Digital Migration of Generation X

The siege of Vukovar (SR Croatia), conducted by the Yugoslav people's army (*JNA*), was the city long-lasting trauma expressed in the re-enacted antiwar graffiti "Shame on you Novi Sad Corps." The period 1991–92, was marked by the anti-war protests in Vojvodina. The civil crisis headquarter in Senta demanded the calling of a referendum—*whether the citizens want war or not*. In Zrenjanin, a petition was organized demanding *JNA* neutrality.[17] *The Spiritual Republic of Zicer* was founded in the village of Trešnjevac, intangible republic did not have a territory, but it had an ambassador and a Constitution that guaranteed the right to freedom of opinion. The opposition to military and political repression was rooted in an urban culture. In 1993, *The good bands of Vojvodina* recorded a wake-up call of Generation X, a song "Voša zove" (*Vojvodina Calling*).[18] The socio-linguistic game of naming a band reflected the attitudes of Generation X, e.g. The Great Contempt, Generation Without a Future, Up in Arms Against Kidnappers, Scream of The Generation, *Eva Braun*, Deaf Bitches, Instant Karma, etc. The trajectory of revolt led to the first edition of the Novi Sad music festival EXIT (2000), held as a rebellion at the time of Slobodan Milošević overthrow.

The generation shift, *Baby boomers→Generation X*, took place in the 1990s, within the context of renewal of the modernist paradigm. The analysis of the 1990s Novi Sad art cycle, i.e., the top-notch exhibitions Museum of Contemporary Art Vojvodina (MoCA Vojvodina, Novi Sad) and art magazine *Projeka(r)t* (Novi Sad, 1993-2001), indicated that the most influential Belgrade art critics and theoreticians (J. Denegri, M. Šuvaković) found a mitigation gateway from traumatic and unlivable war reality by complex linkage with the heroic time of Yugoslav Neo avant-garde form the '60s and the '70s. The theoretical re-enactment of concept art and art requisite to the time of mechanical mass production, stabilized artistic identity in a mode of "functional art". In the 1965 New Tendencies catalog, Dimitrije Bašičević Mangelos wrote on art, that discontinued with "metaphysical categories" in a favor of "research methods"—"Functional art is no longer a picture of the world. It does not represent an object. It creates the object." The discourse of "modernism after postmodernism" (Tomaž Brejc),[19] or „retroavangarde" (Peter

Weibel),[20] set a stage for the emergence of computer-based artworks in Novi Sad. An artwork transferable into the formal codes of the Information age has changed the artist's perspective. An artist–scientist hybrid Staniša Dautović wrote, "An artist as a source of information who emits non-redundant artistic ideas. In that way, the artist-Cathodic joins the general explosion of information, fighting on his way against the implosion of the meaning.[21] Dautović challenged a reader to establish a connection between Malevich's *Black Square* and the following algorithm (*x* is a rational number):

Set[Background,White];
Fill[Rectangle[x],Black]

A milestone event was the Encounter Centre *Movement #1,* initiated by artist Igor Antić, held at the Academy of Arts in Novi Sad (Intermedia Research Studio, 18. February–16. April 1995). Seven-week seminar "Morality and Mythology in Contemporary Art" gathered artists, scientists, and art critics. It was produced as a *workshop on contemporariness* upon the methodology of the Institute of High Fine Arts Studies from Paris (I.H.E.A.P.). The event influenced the orientation of the NS scene toward the site-specific practice based on „social engagement through esthetics"[22], which triggered the transition *expanded media→new media*. In Novi Sad, the U turn of the 1990s *ethics over aesthetics*, came through the antiwar actionism in performance and media art: *DADA-Symposion 1922-1992* (12.12.1992), a happening at the Catholic port organized by Milica Mrđa and Cultural Center Novi Sad; TV video *The Last Dada Performance* (1992), scenario by Jasna Jovanov, directed by Aleksandar Dević, production TV Novi Sad; the works of Bálint Szombathy (1990–1999); *The Flood* (1993) an action at Zmaj Jovina street performed by Led art; *La Pljuzza* (1994) a polygenre action by Branislav Petrić; an action *Human* (Mostar, 1996) and a documentary *1/1* (Vukovar, UNTAES controlled zone, 1997) by association Apsolutno; tactical media campaign URTICA MEDICAMENTUM EST (1999-2001) a rite of passage 1988–2001; *The Traveling of The Dead* (2001) directed by Aleksandar Dević; and a glitch art by

Urtica *I remember the facts I don't want to, and I cannot forget the facts I want* (2001) displayed at the shop window of devastated NORK.

The 1990s new media scene in Novi Sad came into being as dispersive formation. An overlapping point would be „information art," an amalgam of *art, technology and science* by way of Stephen Wilson's definition. The emancipatory potential of ICT became a substitute for the ideas based on internationalism, avant-garde, and the utopian belief in sustainable techno-ecology. Serbo-Croatian, the broken language of Yugoslavia (RAS.ЦЕП), was substituted with *broken English*. The protagonists of the Novi Sad new media scene migrated into the field of digital networked culture and continued to develop production in an interaction with the international media art community. The most prominent grass-root organizations in Novi Sad were New Media Center kuda.org (2001), NAPON The Institute for Flexible Cultures and Technologies (2005) and Share Lab (2015). MoCA Vojvodina had been co-organizing computer art exhibitions since 2003, and *The Center for Intermedia and Digital Art* was founded within the Museum in 2013. An art historian Kristian Lukić introduced a notion of a formatted scene in Novi Sad (new media, digital art) in text "Digital art in Vojvodina" (MoCAVojvodina, 2008).[23]

Due to the Yugoslav war and frozen political conflict, many artists had left Novi Sad. Thus the selection criteria for Novi Sad Generation X—a chronological order of art initiatives that could be analyzed from the point of site-specific media art history and environment art—were made in relation to: 1) artists who received their higher education in Vojvodina/ Serbia; 2) artists that spent the 1990s in FR Yugoslavia; 3) artists that were living in Novi Sad when their most important works were created but at the same time were active internationally. The result was chronological map labeled as "Novi Sad digi.povera" (*NS digi.povera*).[24] The compound "digi.povera" was coined to *signify hi-fi concepts in lo-fi production, the digital art works created in poor conditions, from poor materials, cracked software programs, cheap and used computers*. During the adaptation to environmental complexity *Physical—Virtual*, the artists of Generation X formulated new identities: "artist-Cathodic" (Petrić–Dautović–Maruna), "neutral researchers of

absolutely real facts" (Apsolutno), "anonima" (Urtica), and "hacker" (Eastwood). The chronological map of *Novi Sad* digi.povera could be divided into the following sequences.

Sequence 1995–2000, encompassed the period from 1995, when peace agreements were signed that stopped the war in Croatia, and Bosnia and Herzegovina, until the fall of Slobodan Milosević's regime in Serbia on October 5, 2000. Media artists who emerged onto the Novi Sad scene in the mid-1990s took part at the seminar "Morality and Mythology in Contemporary Art" (Apsolutno, Dević, Dautović), and most of them took part the programs emerged within the cultural policy of New Europe aiming to connect East and West, *e.g.* Forum OSTranenie (1993-1999), or *Syndicate* and *Nettime* (Dević, grupa Baza, Apsolutno). The crossing *Baby boomers→Generation X* was marked by the video works of Aleksandar Dević (1961- 2020) and the new media activism (*e.g. Hybrid WorkSpace*, Documenta X, Kassel, 1997). Dević's video installation *Eyewitness* (1995) was a milestone set-up that introduced the notion of probabilistic nature of the worldview. The *artist-engineer* team Branislav Petrić, Staniša Dautović and Vladimir Maruna were exploring formal systems in the arts, the relationships *Art—Science* and *Science—Religion*. The installation *Chirp Chip/ The Night Sparrow* (Petrić–Dautović, 1996) was inspired by the vision of cutting edge bio-computing (organic DNA computer *TT-100*, Leonard Adleman, 1994)—they based the *symbolic game* on an idea that in the future wildlife will be used for the purpose of calculating and storing data. Association Apsolutno (Dragan Rakić, Zoran Pantelić, Bojana Petrić and Dragan Miletić) realized artworks under the umbrella project of counting down to the beginning of the new millennium 1995:2000. Multimedia artworks of Apsolutno were net art project *0003 Absolute Sale* (1997) produced within the ecosystem of Soros Center for Contemporary Art and CD-ROM *0002 The Greatest Hits* (1998) that problematized the relationship between control and freedom in the context of the ecology of the Information age.

Sequence 2001-2012. The activities of art groups *Urtica, art and media research group* (Violeta Vojvodić Balaž and Eduard Balaž) and *Eastwood–Real Time Strategy Group* (Kristian Lukić, Zvonko Gorečan, Vladan Joler) were

distinctive of the post-October 5 period of new media art in Novi Sad. These artists mostly exhibited their works on the international new media scene, where they achieved professional affirmation and verification of their work. Urtica and Eastwood explored forms characteristic of information technology (database, gaming, interface, icons), some of their works had been produced successively in software versions (*Civilization VI* by Eastwood, *Social Engine 4.0* by Urtica). The common themes for these artists were infowar, cyber-eco systems and relationship *Art—Economy—Society*. Particular project of Urtica that followed the tradition of experiments based on multilingualism in Vojvodina was *Dictionary Of Primal Behaviour* (2003). It was made as an aesthetic communication experiment that combines verbal and nonverbal codes to create a message that is understandable to a wide audience despite their cultural background, linguistic knowledge or world knowledge. The most complex artwork of Eastwood was *Civilization VI* (the 2015 edition), a modification of the popular computer game that introduced as a novelty an authentic interface design and simulation of cyber warfare between the 12 largest world companies in the fight to conquer the Internet.

Sequence 2013-2022. The last segment of the observed cycle defines development concerning the social stratification of actors. The artistic activity was concentrated in the public sector, a move to the academic level included artists that had been working as professors at the Academy of Arts in Novi Sad. It was a representative example of the point at which the social system achieves homeostasis in relation to art as its subsystem. The characteristic representatives were Vladan Joler and Stevan Kojić, and the thematic link between these authors was "new extractivism." Vladan Joler explored the invisible infrastructures of virtual economy. A casestudy map *Anatomy of an AI System* (2018), by Vladan Joler and Kate Crawford, visualized the resources used in the Amazon Echo production cycle which led to the paradoxical conclusion that sophisticated renewable energy technology was based on non-renewable natural resources.[25] *L'art pour l'art* artistic experiments made by Stevan Kojić—amalgam of hydroponic grow systems, digital systems, simple robots and luminous objects—could be decoded as a network of the processed signals that we experience as a work of art. The

continuation of NS digi.povera chronological map, the transition from Generation X to Generation Y (*Millennials*), should include early works of Isidora Todorović such as mobile app. political game *One Good Day* (2013) and strategic game *Can You feel the spill?* (2014) by *Les Misérables,* etc.

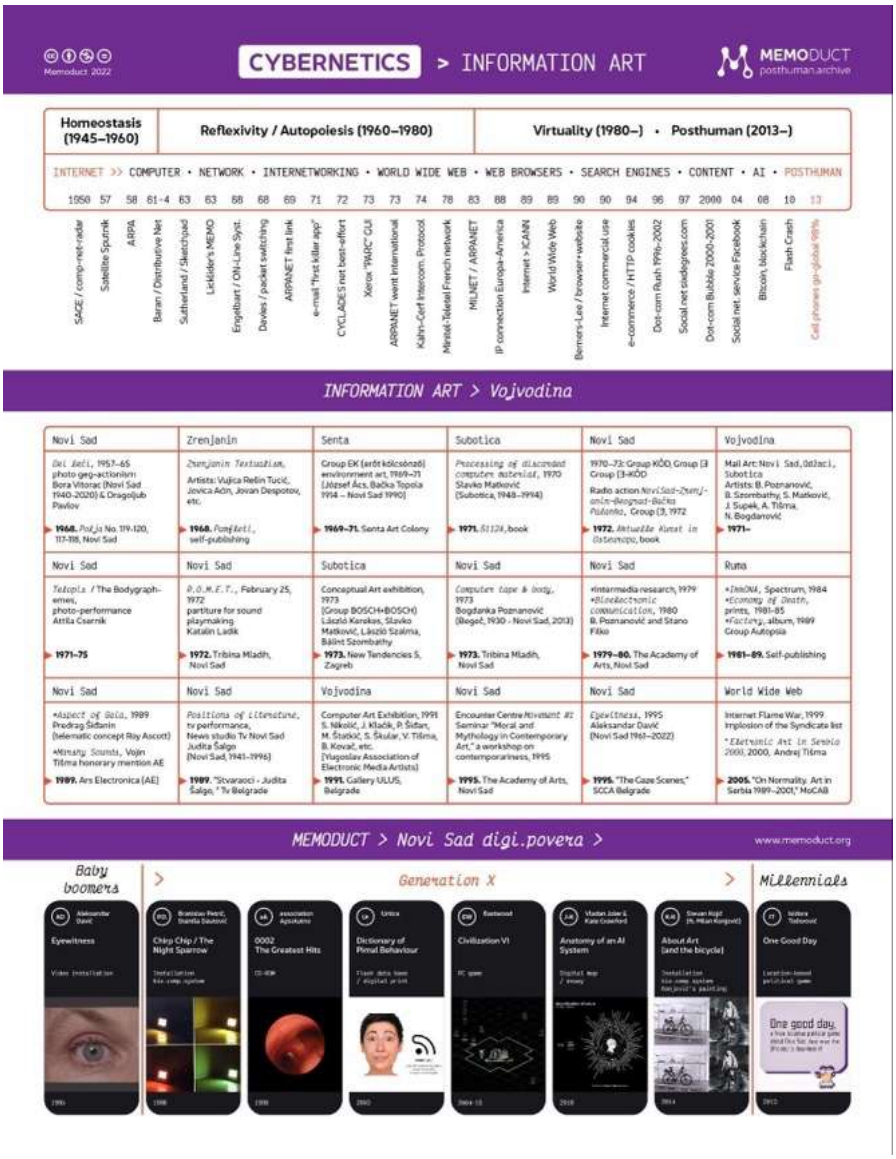

Fig. 1 Map of the Information art in Vojvodina / Novi Sad digi.povera
Design: Memoduct 2022, Violeta Vojvodić Balaž and Eduard Balaž

Conclusion

A paradigm shift of media-born Generation X was rooted in the phenomena such as the microworld, socializing among peers and like-minded people, contempt for the state institutions, principles of self-organization, an idea of the revolution in art, and the influence of mass media products such as music, comics, video, advertising, graphic design, strategy games, and video games.

The analysis made from the perspective of Anthropocene culture—a trajectory of environment art and tactical media in Vojvodina—showed that in the process of adaptation to the complexity of a volatile environment, the artists of Generation X adapted to those segments of the environment, which enabled the maintenance of a stable identity, which implied digital migration and the replacement of real world by virtual world.

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