



Towards posthuman creativity. From kinetic to bio-robotic art

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A work of art as an artist

I wish to look closely at a particular form of robotic art. In its mainstream, so to speak, robots play the role of artworks. As part of the tendency that I will be dealing with here, robotic art pieces created by humans play the role of creative instances for further generations of artworks – thus robotic works become artists, become art creating art. Its sophistication comes not only from the specific status that its creations achieve – they are at the same time subjects and objects, creations and creators. This stems from the hybrid entanglement of various tendencies and art types, and also from the degree of aesthetic problems it provokes, causes and considers through its mere existence.

The form considered here emerges mostly from the entanglement of kinetic, cybernetic and robotic art. It is their mutual relations that line out the area in which art creating art appears. Beside them there is also room for other tendencies.

The art of installation and performance art join the three previously mentioned forms for equally obvious reasons. The specific construction of the artefact that the piece creating art is comprised of fits it into the broadly considered context of the installation. On the other hand, performance art appears in the analysed area because in it we are faced with works that, while undertaking creative activities, at the same time realise a performance for the audience. Thus it is not only the material construction of the artefact, but the activity that it performs which becomes the experienced work of art.

The work of art we are facing is three-fold. First of all, it is an artefact prepared by a human-artist. Secondly, it is an event, a spectacle or performance carried out by this artefact. Thirdly, it is the creation of that performance. This last aspect, nonspecific for performance art, introduces a meta-discursive aspect into the debated issue, leading us towards another tendency entangled in the analysed phenomenon – conceptualism.

Conceptual art, with its meta-artistic approach, plays a very important role here. A mere clash of different tendencies, characterised by the hybrid nature of the considered art creating art, brings consequences of a conceptual-analytical nature. Every tendency entangled in this structure puts the others in an analytical frame of reference. However, the main source of the conceptual character of art creating art is of a more overall dimension. The phenomenon analysed, taken en globe, is a serious challenge for aesthetics and art theory; it problematises its numerous aspects, deconstructs its ideas and paradigms. In this way, it receives a cognitive dimension, becomes a discourse in which cognitive aims complement or sometimes even replace formal intentions. This critical, auto-analytical aspect is precisely what makes it part of a conceptual approach.

The participatory art trend becomes visible in only some forms of art creating art. It only happens when the artwork-artist invites or enables co-operation on the part of its audience, who are then not only observers of the performance made by a machine, but also its participants.

Generative art seems to be an empirical type of art creating art. The latter is understood as art created using an autonomous system. Most frequently mentioned in this context are works generated by a computer, although in this type of art other generative systems are also applied, e.g. mechanical, robotic or biotechnological ones. I do not, however, bring the concept of art creating art to the idea of generative art, since it is my belief that the first one is broader in character. It refers to art pieces that have a multi-level structure that includes the artefact and a second-degree work of art created by it, while in generative art, generating systems are not usually perceived as part of the artwork. Nevertheless, both phenomena are extremely close to each other. The same applies to relations between art creating art and evolutionary art. The latter may be considered a branch of generative art, where systems work on the basis of both evolutionary rules and those of natural selection, which are used as generating procedures. These systems are of computer in character and remain in constant interaction with the artist–human who determines the selection mechanisms.



Mediengestaltung

Monika Fleischmann & Wolfgang Strauss, *Digital Sparks Matrix*, 2006



The last group of tendencies that co-set the field of art creating art emerges as a result of developments in biological art and the simultaneous hybridisation of artistic activities. I place bio-cybernetic, bio-robotic and cyborg art in this group. They are all characterised by the mutual presence of both technical components (including digital ones) and biological ones in the structure of the created art pieces. The creative procedures that are characteristic for them stem from, e.g. interaction between both spheres. Creations of art creating art that are formed under their particular influence are characterised by complexity as well as their having the greatest meta-discursive potential.

All of the artistic tendencies that have been recalled here determine the mutual area in which for several decades now the analysed phenomenon of art creating art has been developing. They play the paradigm role against it, which in this case means that artistic phenomena belonging to it, created at different periods in time, are characterised, to different degrees, by different tendencies, and occasionally by only some of them. Yet it is the interactions between them that build art's dynamics as a whole, hybrid phenomenon, but they also play a crucial role when it comes to characterising its properties and constructing it as a concept.

In the further part of these considerations, I will analyse four examples of works of art creating art, at the same time indicating the constructive variety and meta-discursive structures that are characteristic of it. These works, created by artists with various backgrounds, and belonging to different historical periods of the analysed tendency, when looked at together, display both its durability and cohesiveness, but also major transformations connected with changes in ideas concerning robotics, constructed life and artificial intelligence.

Akira Kanayama – concept against expression

Eduardo Kac dates the work *Remote-control painting* by Akira Kanayama, a member of the avant-garde Gutai group, to 1955.¹ Other sources mention the year 1957² and use the title *Remote-Controlled Painting Machine*³, *Remote-Control Painting Machine*⁴ or *Machine Drawings*⁵. Such discrepancies disappear when it comes to the work's description, upon which everyone agrees. Kanayama created a machine-robot on a platform on a remote-controlled four-wheeled model car. A can of quick-drying paint was placed on top of it. Kanayama placed vinyl on the floor of his workshop and

painted it using the device described above. He later showed a painting created in this way in a gallery.

In every work published on it, attention is drawn to the connection between this artwork and the paintings of Jackson Pollock, describing it as a conceptual attack on expressionism and psychological automatism in art.⁶ Lewis Kachur sees in the works of Kanayama a conceptual critique of painting understood as exploring the unconsciousness.⁷ On the other hand, Mary Flanagan claims that this artist created automated work, thus referring to the area of a game creating art. By replacing the artist at his work, the painting device brought the act of creating "high art" down to the level of a task performed by a machine.⁸ Ming Tiampo stressed that Kanayama problematised the concept of authorship in art in this way.⁹

The commentary recalled above draws attention to the conceptual character of the Japanese artist's art, acknowledging that aspect as the most important feature of his work. Being created at the point where kinetic, cybernetic, robotic, performative, generative and conceptual art cross one another's paths, Kanayama's painting machine definitely privileged the latter, subordinating the others to it (a special place belongs to generative art, as Kanayama's painting machine served primarily a generating role – it brought a painting to life). All of these are present in this work and mutually determine its character and the issues explored. Yet, the basic aim of Kanayama's creative activities was still to create paintings, and the machine to do this was mostly a polemic instrument – a tool for critiquing the artistic concept being questioned. It was the paintings that were mostly shown at exhibitions and not their creation. We cannot be sure whether Kanayama's painting robot was not part of the artistic process, which was only revealed in order to present the intentions behind the paintings. Discrepancies pointed out earlier in naming the works begin to make more sense. Sometimes they indicated an activity contained in the painting and/or its creation, other times they pointed to the painting machine – these terms, regardless of the actual motivations behind them, mutually present the project's ambivalence.

Jean Tinguely – the creative joy of machines

We will also be unable to avoid chronological doubts in the case of the art created by Jean Tinguely. The series that is of particular interest to me here, *Méta-matic*, was first shown in July 1959 at the Iris Clert gallery in Paris. However, the mo-



ment of the first presentation of Tinguely's works does not have to overlap with the time of their creation – for instance, the art museum in Houston informs us that it is in possession of *Méta-matic* No. 9, dated in the collection catalogue to 1958.¹⁰ Moreover, the *Méta-matic* series was not Tinguely's first project connected with creative machines; three earlier works of this kind were made by him as early as 1955, and the first one of them – *Machine à dessiner* No. 1 – was shown in April of that same year as part of the kinetic art exhibition at the Le Mouvement exhibition in Galerie Denise René in Paris.¹¹

Méta-matic and earlier painting machines by Jean Tinguely, like Akira Kanayama's project presented earlier, represent a hybrid tendency combining kinetic, robotic, performative, generative and conceptual art. But if Kanayama's work definitely privileged the conceptual current in this setting, Tinguely's hierarchy spreads differently. The works, considered to be those of the Swiss artist, also undertake meta-artistic discourse, problematizing both the concept of the artist and visions of the creative process. However, in this case, other tendencies surpass the conceptual one on the scale of importance, thus mutually creating a more balanced order than in the case of Kanayama. In this setting, the kinetic current comes to the foreground. This is so because, unlike the works of Kanayama, Tinguely's works of art are kinetic installations that perform creative activity in the presence of viewers. What the public is mainly confronted with is not drawings made by machines, but machines which themselves are part of the creative process. The importance of the generative current bleaks out in this context, also privileged in Kanayama's work, which, suppressed here by expansion of coincidence, loses its position to performative tendency. Among the artistic currents presented in Kanayama's project is a mixture of three: kinetic, performative and conceptual, which determine the nature of the *Méta-matic* series.

They are complemented by two more tendencies, absent from Kanayama's works. As I mentioned before, *Méta-matic* machines are kinetic installations (close relations to kinetic sculptures, as I would probably put it if they did not engage receivers into their actions); therefore, a current of installation art also appears here. A second current – participatory – emerges as a result of the character of the mutual relations which are maintained between creative machines and their paintings.

Pontus Hultén points to two important determinants of these relationships. Firstly, Tinguely's aim was mechanical disorder, irregularity, unpredictability and mechanical uncertainty, so he gave his machines precisely these features.¹² The artist turned out to be a continuator of the Dadaist approach that privileges the role of accident in art. Secondly, these relations are co-shaped by the audience. Machines can be "programmed" in various ways: one can set their mechanisms, use a pencil, fountain pen or even a stamp, determine the duration of the machine's continuous work, the time of work, using a certain colour or number of machines.¹³ And this is the role or a task of the public. Due to the second aspect of these relations, Tinguely's work reveals a participatory current. This does not, however, mean bringing machines to the level of tools. As Jean Tinguely once put it himself: "If you respect the machine, if you enter into a game with the machine, then perhaps you can make a truly joyous machine; by joyous I mean free".¹⁴

Both indicated dimensions of these relations, through co-operation, become a source of variety in the created drawings, adding not only to their theoretical, but also to their practical uniqueness.¹⁵

In the case of Tinguely's works, we are dealing with yet another stage of development in an artistic approach of interest to us. Kanayama's project introduced both a post-human element, which is basic to it, and a post-humanist perspective, mostly in terms of the artistic process, personified in the structure of the work and, to a lesser degree, in the form in which it is experienced. The paintings of the Japanese artist lost those properties which allowed them to be connected to his psychological sphere or unconsciousness, yet they ultimately remained artworks. Museums and galleries showed Kanayama's machine-made paintings at exhibitions, and not the painting machines. In the case of Tinguely, the situation was exactly the opposite. His basic creation is always a drawing machine. The machine is placed in museum collections and is shown at exhibitions. Its presentation takes on the form of a participatory performance that engages the audience. The result of such a performance, i.e. the artwork of a machine, becomes a creation of the second degree – a work of art created by a work of art.

Patrick Tresset – towards a digital creative identity

Robot Paul created by Patrick Tresset is a portraitist. It appeared for the first time in June 2011 at an solo exhibition of



Tresset's work at the gallery of Tenderpixel in London.¹⁶ Similar to Tinguely's works, Paul not only draws portraits, but also turns this activity into a gallery performance. It has the form of a robotic arm mounted on a table counter, complemented by a mobile camera, which is also embedded there. A hand and an eye – external attributes of a cartoonist. These visible elements of Paul are clearly technical in appearance, as are the visual aesthetics of the set overall. Tresset is not at all interested in anthropomorphic form, which is so frequently found in robots. In interviews, he stresses that Paul does not try to copy humans in his passion for drawing.

The term installation in relation to the works of Tresset loses the connection with sculpture that is clearly present in Tinguely's works, bringing to the foreground the system of relations that defines it.¹⁷ Relations that develop – in this case – between the physicality of the artefact, the technological materiality of hardware, and the digital immateriality of software, but also between the environments of the artwork are defined by these three dimensions, and the audience is immersed in it.

Similar to Tinguely's case, however, Tresset's robot Paul becomes part of his creation, which can be understood within the context of both a creative robot and the drawings – portraits that are made by him. A creative act, a portrait performance by Paul carried out in the presence of the viewers, who become models, are connected by both ingredients of Tresset's project – a robot and drawings – blended into one artistic whole with the hybrid order.

Tresset's project is realised in the area where art, computer science and robotics meet. As a result of this co-operation, Paul's eye and hand became one. He had the opportunity to draw from observation thanks to computer modelling and robotic technologies. Together with Frédéric Fole Leymarie, as part of the research projects *AIKON (Automatic IKONic drawing)* and *AIKON II*, Tresset created an artificial mind that processed data fed by a camera-eye, and then sent the command to a robotic drawing hand. It is neither chance nor participatory interference by the audience, but artificial intelligence that manages Paul's creative processes.

As part of the *AIKON* project, Tresset and Leymarie worked on a generative computer system that would be able to simulate processes required in the drawing of a portrait. This system makes use of face recognition techniques, and then determines the main lines that outline its shape, which is

later followed by shading contours. In its activities, it uses knowledge concerning the functioning of the part of the human cerebral cortex responsible for processing visual information.

In this way, Paul gained the ability to draw faces. Where did he take his style from? Even a quick overview of his drawings reveals a clear similarity, their stylistic homogeneity. This time the source is Patrick Tresset. It was his way of drawing that Paul "assimilated". While preparing a system that managed Paul's creative behaviour, Tresset and Leymarie analysed Tresset's process of drawing (limiting the area of research to the way he drew faces). Then they pitched this process into a sequence of steps, so as to later carefully study each one of them individually. In consequence of their analyses, they prepared a system in which each step could be transformed into an algorithm operating as a result of the previous one, resulting in a sequence that copied the hand of an artist – Tresset's style.¹⁸

This is how Paul received his creative identity – an artificial imagination was born. Tresset played the role of a teacher, shaping his artistic personality, not through cultural programming (as is done with students of art schools) but with IT programming. The system that Tresset and Leymarie created, which determined Paul's creative possibilities, can be called subconscious. Its algorithmic structures outline both the autonomy of Paul's digital identity, and its connections with Tresset.

Paul's performance is also of importance. The system created especially for him opens up windows of opportunities for the theatricality of his behaviour. Thanks to it, both the performance and Paul's artistic skills that become visible because of it when confronted with the public's expectations, allow a platform of communication to be created between the robot and the human world, which is so important for Tresset; communication which aims at naturalising the robot in this.¹⁹

Among the tendencies that define where this form of art creating art develops, the robotic current is of special importance, particularly its generative and performative aspects. I recognise the conceptual current as their direct background because we are still faced here with activities that significantly problematize the paradigm of art. Critical reflection concerning the artist's status in the world of creation returns once again here. However, this issue is accompanied by a



new realm of controversy, directly connected with the relations that art has with the world of science.

For the first time in the contention about art creating art it has been put forward that we have discovered what lies at the root of the construction of the artwork – references to science relevant to its character. This characteristic will be on the increase and intensify. The need to create an autonomous being capable of artistic creation may be realised more effectively nowadays with the participation of researchers dealing with the issue of artificial intelligence, artificial life, genetics or neuro-engineering. Art engaging in these contexts leads to the emergence of new problems that complement, develop and replace the issues undertaken so far. The cognitive aspects of these activities, which until now have taken on the form of a conceptual tendency, are finding new challenges and forms for themselves.

The creativity of cyborgs

If in the case of Kanayama and Tinguely, the initial challenge was to locate the analysed works in time, in the case of *MEART: The semi-living artist* project, which is the subject of this last part of my reflections, it seems troublesome to point to its authors. The complexity of the project, resulting from the span between art and several scientific disciplines, meant that what we are dealing with here is teamwork. The project was realised thanks to the co-operation of the SymbioticA Research Group, located at the University of Western Australia, Perth, and scientists from the Neuroengineering Laboratory at the Georgia Institute of Technology, Atlanta, USA. The project team included Guy Ben-Ary, Philip Gamblen and Steve Potter, PhD.

The first stage of *MEART*'s development was an installation entitled *Fish & Chips* (2001). The name was changed because the neurons used in an early version of the installation, which had been collected from the brain of goldfish (Fish) and were bred on silica integrated circuits (Chips), were replaced by neurons collected from the grey mass of a rat embryo that were bred on a Petri dish with the use of microelectrodes (MEA). The name *MEART* – abbreviation of *Multi-Electrode Array aRT* – tells us that we are faced with art whose source (brain) is in a cell culture communicating with its environment via an electronic circuit.

MEART was presented in 2002 as part of the Electronic Arts Biennale in Perth. It may be described as a bio-cybernetic or neuro-robotic work of art.²⁰ Three components may be distinguished in its structure:

1. Wetware – neurons and glial cells collected from a rat's brain and cultured on an MEA;
2. Hardware – a robotic drawing arm;
3. Software – an interface enabling communication between the wetware and hardware.²¹

It should be added here that the first two components are geographically separated. The wetware was placed in Potter's laboratory in Atlanta and the hardware at the art gallery in Perth. The internet was used as a communication tool.²²

Besides a robotic arm and a computer system, there was also a camera at the gallery, registering the physiognomy of a selected receiver and the drawings made by the robotic arm. An individual picture showing the receiver's face is processed into a signal of low frequency – 64 pixels – corresponding to the number of electrodes connected to the wetware (they monitored 60 channels of activity of the cultured neurons – MEA-artist's brain). This signal then reaches the wetware as an electric impulse, causing processes that are later registered and sent back to the robot – hardware in the form of impulses processed in such a way that they can represent the activity of neurons, and generate the drawing arm's movements that correspond to them. The processed picture of a drawing made by them then comes back to the *MEART* brain. We are dealing here with a creative system that functions as a cybernetic one, able to create and receive impulses and receive electric stimuli as a reaction to its activities in real time.

MEART can see the world through a camera that acts as its eyes. It can process what it sees by means of the neurons which act as its brain. It can appropriate actions by means of a robotic arm that acts as its body. The internet functions as its nervous system.

MEART embodies the idea of controlling a robot with the use of brain cells collected from a body and connected through an interface to electric devices. It is a concept for the aesthetic use of living cells connected to a physical object. *MEART* is both a scientific experiment studying the network mechanisms that produce directed adaptation behaviour²³ and – most of all – an artistic project aimed at creating an autonomous artificial artist. *MEART* as an artwork and an artist at the same time is a bio-cybernetic being that perceives the world, a being that is unpredictable and creative. Not only does it create art, but it also analyses the surrounding reality.



All three components of *MEART* highlighted earlier – wetware, hardware and software – blend into a network to create a hybrid artistic structure that could be described per analogiam as artware. It is a cyborg form – a semi-living one – living and technological at the same time, not fitting into aesthetic nor academic definitions or typologies of life. A semi-living being that speaks through artistic activity and is capable of learning, and – as a result – of self-transformation. That is why it is very interesting for scientists who hope that a semi-living artist, entangled in its neuronal activity between perception, activity and stimulation, will find out something about itself and its environment.²⁴ And will share this knowledge with them.

A form through which *MEART* speaks artistically, i.e. its drawings, I will describe as meta-artware to draw attention to the aesthetic complexity of the phenomena described here. What we are faced with here is two levels of artistic communication: *MEART* – artware and its creation: drawings as meta-artware. “Meta” here means both a second-degree work of art created by the artwork and the meta-artistic character of the creativity that it undertakes – a work of art created so as to, through its existence and form, critically reflect on the modern world of art and basic aesthetic concepts.

MEART triggers artistic tendencies that we have yet to encounter in the realm discussed here: bio-cybernetic art, bio-robotic art, and cyborg art (in their direct background we may find a conceptual tendency, but also generative and performative ones). They introduce us to the world of the third culture of C. P. Snow, into an environment where art develops in direct dialogue with science. *MEART* repeats questions about what creativity is, what the position of the artist is, and how an artwork’s status should be defined; but this time it forms its doubts in the context of the relation between art and science. And in this context, these questions change their subject. What we are now interested in is the question of to what extent post- and trans-humanistic tendencies change our way of thinking about art, what the position of the artist is in a post-biological world, and how biotechnological evolution and the birth of synthetic biology influence our ways of defining creativity. In the space where we seek answers to those questions, artistic, aesthetic, scientific, ontological and ethical issues cross each other’s paths. They all penetrate one another, eventually taking on a form that is as hybrid as the one characterising the cultural phenomena being studied by them.

Conclusion

The four examples of artwork recalled above represent a radical artistic approach within which the created pieces of art become the subjects of further artistic activities. Each one of them fits into the following cycle:

A human as a subject of creative activities the creation of human artistic activities – artwork as an object of meta-creative/second-degree creative activities the result of meta-creative activities – meta-artwork/second-degree work.

The two first examples belong to the order of the modernist avant-garde, where meta-creation serves as a de-constructor of traditional aesthetic concepts, such as the artist, creativity, artwork and aesthetic experience, fitting, at the same time, fully into the frames of the art world. The following two, on the other hand, are part of a post-modern system defined by such categories as transgression, hybridisation, post-biology, post- and trans-humanism. They initiate discourses that are directed beyond the world of art, concerning problems that are basic to human, or rather, post-human kind.

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