BALKAN JOURNAL
OF PHILOSOPHY

Vol. 15, Issue 1, 2023

The issue is sponsored by the Bulgarian National Science Fund, competition "Bulgarian Scientific Periodicals – 2023", project No: КП-06-НП4/52 from 05.12.2022

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SPECIAL ISSUE OF "BALKAN JOURNAL OF PHILOSOPHY"

the topic of the 2023 special issue of our journal: "CREATIVITY AFTER AUTOMATION"

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The new field of "computational creativity" (CC) (also known as "artificial" or "algorithmic creativity," "creative computation," or "creative AI") has grown in popularity with the recent advances of deep learning and other cutting-edge forms of machine learning algorithms. During the past twenty years CC has developed into a discipline of its own within the domain of artificial intelligence, which explores "the capacity of machines to both generate and evaluate novel outputs that would, if produced by a human, be considered creative" (Veale & Cardoso, 2019, p. 2). The focus of computer scientists is to *systematise, formalise*, and thus *automatise* what was once deemed a rationally inexplicable and almost supernatural capacity of some human individuals to generate truly new ideas and artistic masterpieces. In their attempts to mathematize creative behaviour, CC researchers reduce creativity to specific processes, algorithms, and knowledge structures. At stake here is to program what is the least programmable, that is, the freedom to deviate from the program and from predetermined rules. The goal is to design machines that produce outputs that are novel, surprising, and have value–all these judged by human users. Novelty, surprise, and value are the features of creativity advanced by Margaret Boden (2004) along with her classification of the three types of creativity: exploratory, combinational, and transformational.

The underlying assumptions about the concept of creativity implied in the technical formulations above have evoked the critical responses of various humanities researchers, who have pointed out the reductiveness and intrinsic contradictions in these definitions from aesthetic, philosophical, and historical perspectives (see Still & d'Inverno, 2016; Du Sautoy, 2019; Fazi, 2019; Zylinska, 2020; Stephensen, 2021). Some of the researchers emphasise the historical richness and ambiguity of the concept of creativity itself (Still & d'Inverno, 2016) and, hence, its ideological bias and political consequences (Stephensen, 2021). Others insist on the intrinsic potential of algorithms for creative expression according to their own nature (Fazi, 2018), thus denouncing the flaws of the "imitation game"

(Turing, 1950), and urge us to recognise machine and other forms of intelligence and perception as co-creative agencies (Zylinska, 2020).

In light of these critiques, I would like to address the question of automated creativity from at least three different perspectives: the human-centred, the machine-centred, and the systemic.

Creativity is the last frontier believed to be impenetrable to automation. When fortress after fortress of “uniquely human” cognitive capacities–memory, reasoning, learning, intentionality, complex pattern recognition, symbol manipulation, prognosis/prediction–fall one after another to the computational logic of algorithmic automation, creative imagination is still believed to symbolise every bit of what it means to be an embodied human being. Creativity as it was advanced by Kant’s theory of genius is radically opposed to imitation and pre-programmed rule-following. Illuminated by this understanding, computer scientists’ definition of creativity formulated in the footsteps ofTuring’s “imitation game” seems a contradiction in terms. On the other hand, the proposed mechanisation of the creative process calls for a more nuanced rethinking of the dynamics between imitation and originality, and has to be considered as a potential challenge to the very notion of individual authorship and human exceptionalism.

The second direction questions the notion of automation itself. Regarding automated creativity, we may imagine the mechanical automatons of Descartes and nineteenth-century industrial machines whose operation is fully controlled by predetermined procedures. However, as Yuk Hui (2019) and other researchers have shown, machines developed after mid-twentieth-century cybernetics are becoming less and less mechanical and more and more lifelike. While deterministically driven mechanisms break if they accidentally deviate from their predetermined program, cybernetic systems are open to contingency and incorporate it as part of their operative power. Thus, instead of mindlessly repeating the same outcome over and over, cybernetic machines utilise feedback, thereby generating novelty at every recursive turn.

Let’s return to the question of creativity, this time going beyond the dichotomy between human and machine. If we consider creativity the force that brings novelty into the world, a force which is universal, how may we think of computation as creative? How can we reimagine the concept of computational creativity as a shifting *epistēmē*, an underlying sensibility in the sense advanced by Hui (2019, 2021), which sets the conditions of our existence in relation to the cosmos and which, consequently, demands that we generate new syntheses of thought? From this perspective, the question of computational creativity needs to be articulated in light of algorithmic logos creating systemic conditions for structural transformation of the world, reconfiguring the bonds between space-time, objects, and actions. It is a new algorithmic governmentality operating beneath the surface, which Benjamin Bratton (2015) termed ‘the stack’–a megastructure of multiple layers of systemic organisation stretching at a planetary scale that follows the contingencies of its own internal logic. If the current creative power of computation is rather systematising and totalising, tunnelling the future into mere probability of the past, what forms of resistance to this closure could we think of? How can we mobilise this creative power in the opposite direction so that it generates the diversification and radical openness of the future?

The discussions in this special issue are invited to go beyond a perspective that assumes a mere opposition of automation and creativity and to mobilise cosmotechnical (Hui) interpretations of computational creativity from non-anthropocentric, Indigenous, Afrofuturist, post-communist, East Asian, techno-feminist and other embodied localities, cultural intuitions, and technogeneses.

Possible topics include but are not limited to the following:

- Creativity and automation
- Creativity and cosmotechnics (Hui)
- Automation and de-automation
- Computational aesthesis (Fazi)
- Computational creativity and deindividuation of authorship
- Computational creativity and systematisation
- Planetary scale (Bratton) creativity, the noosphere (de Chardin)
- Computational logic and aesthetic sensitivity
- Techno-logos, instrumentality, creativity
- Technological innovation, scientific discovery and artistic creativity
- *Tertiary protention* (Hui) and creativity
- Creativity and recursivity
- Creativity and the ‘imitation game’ (Turing)

BALKAN JOURNAL OF PHILOSOPHY. Vol. 15, Issue 1, 2023

Articles

Invited paper

IMAGINATION AND THE INFINITE —A CRITIQUE OF ARTIFICIAL IMAGINATION*

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Abstract:
This article addresses "Creativity after Computation" by looking into the concept of artificial imagination, namely the machine's ability to produce images that challenge artmaking and surprise human beings with the aid of machine learning algorithms. What is at stake is not only art and creativity but also the tension between the determination of machines and the freedom of human beings. This opposition restages Kant's third antinomy in the contemporary technological condition. By referring to the debate on the question of imagination in Kant, Heidegger, and Stiegler, the article suggests that imagination is always already artificial and that it is more productive to develop an organology of artificial imagination. It clarifies the notion of artificial imagination and offers an organological reading through a reinterpretation of Leibniz's monadology, Kant's sublime, and Schiller's aesthetic education against the backdrop of recursive algorithms.

Key words: Artificial Imagination, Algorithm, Kant, Schiller, Lyotard.

The special issue's call invites us to reflect on creativity after computation. The word "after" suggests that creativity thus understood precedentially is already exhausted by computation, and therefore, the call anticipates a new, if not radical, understanding of creativity to come. What is this new creativity that cannot be exhausted by computation? Or to be more skeptical: is it not simply a question of time? That is to say, one could make a list of what machines cannot do today as Hubert Dreyfus did (Dreyfus, 1972), but this does not mean that they would not be able to do it tomorrow, meaning all skepticisms towards machines are only temporary, and therefore, only weak critiques. Though modestly, we will take up this challenge in this article by approaching the question of imagination.

However, can we address the limit of machines at all? Since the rise of a technological consciousness around the time of the industrial revolution, we have been constantly haunted by a future wholly determined by technology. At the same time, it is almost impossible to articulate the end of this process clearly and, therefore, extinguish the mixed feeling of fear and enthusiasm. In aphorism 124 of the *Gay Science*, titled "In the Horizon of the Infinite," Nietzsche described a scene in which the moderns abandoned their villages, burned the bridges, and sailed to the infinite ocean; however, "times will come when thou wilt feel that it is infinite, and that there is nothing more frightful than infinity" (Nietzsche, 2001, p.119). The moderns, "the poor bird that felt itself free now strikes against the walls of this cage!" (Nietzsche, 2001, p.119). This passage in the *Gay Science* might serve as a reminder of the paradox of the infinite, which produces melancholia; it is both freedom and a cage.

§1. Schiller's Aesthetic Education Reconsidered

Today, technological acceleration leaves us more and more bewildered, and grand space exploration projects anticipate the apocalyptic end of the

* The first version of this essay was presented in French in January 2018 at the ENS in Paris under the invitation of the artist Gregory Chatonsky who organized a series of seminars on the theme "artificial imagination," and latter versions were modified throughout the years.

spacecraft earth. Artificial organs have expanded at such speed and volume that the human soul can no longer accommodate them. This disproportion between the soul and artificial organs is the source of *hubris*, destruction, and the war we are witnessing today in Europe–and in the future at a global scale. In the context of this call to reflect on creativity after computation, one could ask: What can art do in this process of organological acceleration? Or perhaps another question should be asked first: Will the increasing power of machines finally render art obsolete? Machine learning algorithms can now produce images whose authorship is no longer easy to judge, which may surprise any master of painting. We might call it artificial imagination and ask whether this is the end of the infinite, meaning there is nothing fearful left in the infinite because human beings, with their technologies, will now be able to triumph over it. Or is this infinite itself a *limit* that has *yet to be infinitized*? I hope that through these questions, we can arrive at a new interpretation of the end of the infinite and answer the above questions pertaining to art "after" computation.

Before we start addressing the above questions, we will have to answer two more fundamental questions: What is imagination? What does imagination do? These are fundamental because without elaborating on them, we will fail to understand artificial imagination and continue viewing it merely as the production of images. And more and more, we will become fascinated by the complexity of those algorithms capable of producing images beyond human imagination, as illustrated by the recent paintings made by AI and robotic arms, as well as by the wide use of software such as Tensorflow and Midjourney. It is true that machines today, especially once machine learning algorithms are considered, can produce images that are surprising to human beings. The increase in their capacity for precision and sophistication has consequently meant that they are now thought to be able to replace artistic creations. However, I would like to show, firstly, that imagination is precisely not only about the production of images; on the contrary, to think about imagination, it is necessary to go beyond images. It is a fallacy to think of artificial imagination as *equivalent* to human imagination. It is unproductive and prevents us from uncovering the problems that, following Kant, could be called the *conflict of faculties*.

However, determination through calculation on a large scale has indeed arrived, as we all experienced during the pandemic. The word imagination achieves its banality if it means simply a preemptive logic based on calculation, though such an understanding has a significant meaning in state governance and politics. The question of artificial imagination must be situated in a broader context related to aesthetic education, artistic creation, and politics, given the role machines play in decision-making and shaping our environment. When I say aesthetic education, I refer to Friedrich Schiller's *ästhetische Erziehung* (Schiller, 1983), which does not mean a formal education [*Ausbildung*] but rather the cultivation of a sensibility towards aesthetic forms. Schiller was addressing a question analogous to ours, namely the confrontation between laws of nature and human freedom. Schiller wasn't the first who raised it, but he was probably the first who explicitly attempted to resolve it via aesthetic education. Kant was the philosopher before him who, in the *Critique of Pure Reason*, formulated an antinomy concerning the laws of nature and freedom and whose *Critique of Judgement* inspired Schiller. It is worth going back to Kant's third antinomy as a reminder of the complexity of the question and how Kant resolves it.

> Thesis: The causality according to laws of nature is not the only causality, from which the appearances of the world can thus one and all be derived. In order to explain these appearances, it is necessary to assume also a causality through freedom.
> Antithesis: There is no freedom, but everything in the world occurs solely according to laws of nature (Kant, 1996[1781] A445 B473).

Kant is not yet dealing with the question of freedom from the perspective of practical reason, but only pure reason. Kant resolves the antinomy through his transcendental idealism by associating the thesis with the thing-in-itself and the antithesis with the phenomenon. For the thing-in-itself might be free from the causal laws of nature, but all appearances, nonetheless, follow the laws of nature. Therefore, according to Kant, both the thesis and antithesis are true. Schiller's creativity lies in his transformation of the opposition between the laws of nature and freedom into a political one, in view of the French Revolution, which presents an opposition between the tyranny of the state and individual freedom. Schiller wanted to overcome or bridge these oppositions through a third way: art. In this construction, the aesthetic relation takes up an *organological* function, presenting itself as a unifying force, constituting a *living form* (*lebende Gestalt*). When I say Schiller is raising a question analogous to ours, this is because the imposition of rationality in the name of calculation has also arrived for us; it is something we find every day in mass media concerning the use of big data in artificial intelligence, machine learning, surveillance technologies, etc. We will not be able to approach this gigantic question directly; we wish to leave it in the background, where our discussion will frequently return.

§2. The Artificiality of Imagination and the Determination of Machines

What does one mean by artificial imagination? First, I would like to demonstrate that imagination is already fundamentally artificial. As is patent, the word imagination already carries the term "image" in it, as is also the case for the word in German *Einbildungskraft*, *einbilden* precisely means the force of producing images. Imagination is to make present something that is not yet present to me. The Greek words in Plato's dialogues which carry the meaning of imagination are εικαςία and φαντασία, conjecture and fantasy. To guess is to anticipate what has not yet happened; to fantasize is to conceive something that would not normally happen. Precisely because imagination is an act of freedom which starts with the given and arrives at a *telos* intrinsic to its own capacity, imagination is ultimately a mysterious force, one of the reasons why the artists and poets were condemned.

In the *Critique of Pure Reason*, Kant states, "…imagination has to bring the manifold of intuitions into the form of an image" (Kant, 1996, A120). He considers the "transcendental imagination" as the ground from which sensibility and the understanding, or receptivity and spontaneity, grow. Heidegger describes transcendental imagination as spontaneous receptivity or receptive spontaneity. But the ground of imagination is unknown; transcendental imagination is a strange force inside transcendental apperception. Kant says that synthesis, in general, is a simple effect of imagination; however, it is "a blind but indispensable function of the soul" (Kant, 1996, A78 B103). We know that in edition B of the *Critique of Pure Reason*, published in 1786, six years after the publication of edition A, Kant has undermined the role of transcendental imagination, and the understanding alone is responsible for the schematization. Heidegger explores the significance of Kant's modification in his *Kant and the Problem of Metaphysics* (Heidegger, 1997[1929]), and retrospectively, the book can also be seen as a critique of the Neo-Kantians who wanted to lay down science, especially mathematical logic, as the ground of Kant's transcendental philosophy. Heidegger instead mobilizes this modification to show that Kant's shrinking back in Edition B precisely exposes the foundation of metaphysics since imagination is not a logical operation but rather a temporal operation which should be situated within Dasein's finitude.

Bernard Stiegler, in his *Technics and Time* vol. 3 (Stiegler, 2010), attempts to show that Kant's three syntheses, namely, apprehension in the intuition, reproduction in the imagination, and recognition in the concept will not be able to complete their functions without a fourth synthesis, which is artifact, since recognition implies that something is kept in memory, while this memory will also depend on external memory–for example, symbols, the concept of the infinite being only graspable through the sign ∞. We may want to follow Stiegler here by calling it the fourth synthesis. That is, imagination is not exclusively limited to the human mind, but rather it involves material supports without which the human mind will be limited to repetitive activities; for example, one would not be able to understand the infinite if one had to count it. What is newly raised is that there has been an evolution of the fourth synthesis, the dynamic between the fourth synthesis and imagination having changed over time (Hui, 2016). With the advancement of digital technology, the fourth synthesis constitutes a computational hermeneutics in which human and machine relation must be conceived as a recursive coupling, where the latter has more and more capacity to determine the former. We are not talking about humans on the one hand and recursive algorithms on the other; the reality is that we are all integrated into gigantic recursive operations, for example, Google Search.

Even if we follow the above argument that imagination is fundamentally artificial, we still need to clarify the role of "artificial imagination" in machines since machines are no longer just a passive medium of support but also actively participate in the cognitive process of imagination. However, this is not to say that artifacts before the computational age had no capacity to constitute the imagination. Art would, of course, be the counterexample since the question of imagination is fundamental in artistic, that is, artificial, creation and expression. In view of the banality that is given to the term artificial imagination, namely that machines will be able to replace visual artists in terms of art making, it will be the task of art to *reopen* the question of imagination by giving it a new role and going beyond the limits of industrial expectations. Now, given that we recognize the artificiality of imagination, the question that remains to be asked is what is the role of the artifice, and how does it affect our inquiry into creativity after computation?

It is unjust to equate modern computational machines with those of Descartes's time that were merely mechanical in nature; as argued in *Recursivity and Contingency*, modern computational machines are becoming organic as opposed to mechanic (Hui, 2019). Nonetheless, it is equally fallacious to mystify artificial imagination, especially concerning machine learning, with terms such as "non-supervised machine learning," with many thinking that this means without *telos*, with no specified goals; since this is incorrect, "non-supervision" simply means that the machine is allowed to automatically define data, for example, to classify raw data by giving them structures without following pregiven rules. The differences between the recursive process of imagination produced by machine learning and that of the human thus juxtaposed needs, therefore, to be clarified in different ways, and that is what I propose to now discuss regarding the concept of the infinite.

One might think that while machine imagination is finite and limited due to the constraints of memory, storage, and computational power, human imagination is infinite. However, this is by no means a good demarcation because the human is firstly defined by finitude, namely mortality. Secondly, computational machines are powerful precisely because they are capable of dealing with the infinite. Therefore, the question is more than merely about the opposition between the finite and the infinite. We will, therefore, have to elaborate on the notion of the infinite to show that different types of infinity may allow us to address this distinction.

§3. Infinite and the Finite in Mathematics and Aesthetics

The first type of infinity is, of course, the "bad infinity" in the Hegelian sense of the term; it means a homogeneous increase without termination, for example, infinite addition. This is a mere repetition without end, or to reference a more sophisticated example, finding the largest prime number, which, incidentally, was a method once used to block a shared computer so that no one could continue using it. It is a bad infinity since it exhausts any being, whether human or computer. The second infinity is the mathematical infinity that is fundamental to calculation. Leibniz is the thinker of the mathematical infinite. His metaphysics and calculus are based on the concept of the infinitesimal, which is indivisible but without minimum. Leibniz's calculus divides the curve into infinitesimal parts, and the area under the curve is the sum of all the infinitesimal parts. Like the curve, ocean waves consist of infinitesimal sounds and noises, the "*petites perceptions*," which, although not individually distinguishable, nonetheless exist in their own right. The infinitesimals can be expressed by a finite number of signs. This is the basic principle of Leibniz's philosophy of substance (e.g., the complete notion of individual substance) and his monad; it is a system of signs that encompasses the infinite in the finite. This is not acceptable for the Cartesians precisely because the inscription of the infinite in the finite is based on the concept of the organism, which can only be attributed to the soul; if this were true, it would be possible to admit that a stone also has a soul. Leibniz retorted that the Cartesians think more often in terms of signs than they believe. A simple example will suffice here. For Leibniz, the value π, which we call a *transcendental number*, can be expressed through a mathematical formula, which though extending to the infinite, can nevertheless be grasped in the finite:

$$\pi = \frac{4}{1} - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} \cdots$$

$$\sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1} = \frac{1}{1} - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \cdots = \frac{\pi}{4}$$

$$4 \sum_{k=1}^{n} \frac{(-1)^{k+1}}{2k-1}$$

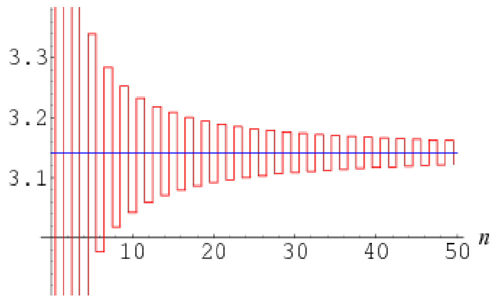

Figure 1. Leibniz formula for calculating the transcendental number π

The Leibniz formula can be simulated with a recursive algorithm with precision specified:

```
public static double Algorithm(int m, double Pi)
{
    {
        Pi += 4 * (Math.pow(-1, m - 1)/((2 * m) - 1));
        if (countDigits(Pi) < 6)
            Pi += Algorithm(m + 1, Pi);
        return Pi;
    }
```

Here we find in computer algorithms a completeness that is analogical to the complete notion of an individual substance, according to Leibniz. With the concept of recursivity, such a substantiality is measured by the minimum amount of code required to express such a result. In Leibniz's *Monadology*, these recursive algorithms are made possible by the mirrors, which reflect what is reflected and continue ad infinitum (Leibniz, 2014). The infinite is not impossible; rather, it could be mathematically comprehended as a limited number of steps of reflection. It is also the reason for which the mathematician and pioneer of algorithmic information theory, Gregory Chaitin, redefined Leibniz's "best of all possible worlds" as one that uses the minimum of rules to produce the maximum varieties of phenomena (Chaitin, 2005):

> …God has chosen the most perfect world, that is, the one which is at the same time the simplest in hypotheses and the richest in phenomena, as might be a line in geometry whose construction is easy and whose properties and effects are extremely remarkable and widespread…But I do not claim to explain in this way the great mystery upon which the entire universe depends (Leibniz, 1989, p. 39).

An algorithm encloses a world like a monad reflects the world in its entirety, and like the monads, algorithms construct the world according to simple axioms. However, this infinity is a numerical infinity. The computational world is a world of numbers and the milieu in which an algorithm can prove its existence. If we look at a machine learning algorithm of image recognition, an object, namely an image, is analyzed as a matrix of numbers; for example given a series of handwritten numbers, for the machine to recognize among many numbers the number 8, it will have to analyze the image in terms of a matrix of values and vectors; the algorithm of recognition itself is recursive since it continues improving itself by actualizing the deviation of errors.

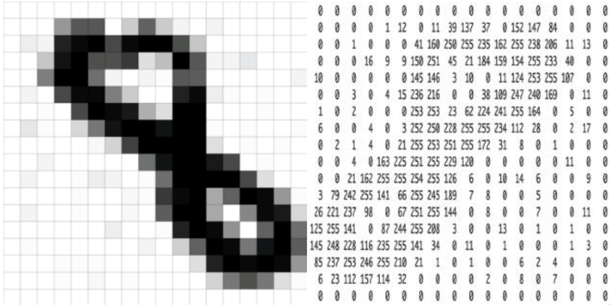

Figure 2. https://medium.com/@ageitgey/machine-learning-is-fun-part-3-deep-learning-and-convolutional-neural-networks-f40359318721

Therefore, the issue is not that artificial imagination cannot deal with the infinite but rather that it has a specific mode of inscription of the infinite. However, these modes of inscription share something in common. This commonality is found in what Kant calls the mathematical sublime, but we will have to be very careful here since a novel reading of Kant's sublime is necessary in this case to address the question of aesthetics in the context of our discussion. The aesthetic infinite is analogical to the mathematical infinite; however, it cannot be reduced to the latter. As an analogy, the aesthetic infinite always has the tendency to exhaust the imagination, and the imagination, being the force of synthesis, will need to be halted by reason. This means that the understanding alone failed to grasp the sublime object by subsuming it under a concept, while the imagination being free, progressively provokes the intervention of reason as a terminator. The mathematical sublime of Kant's machine, so to speak, is the moment when the machine comes into an infinite loop of comparison and calculation of magnitudes, to the extent that an external force has to intervene to prevent the machine from exhausting all its resources. For example, in encountering a pyramid, when we are too close to it, our gaze always rests on successive apprehensions (*Auffassung*) without being able to comprehend (*Zusammenfassen*) the pyramid as a unity (Kant, 2007 [1790], §26).[1] Reason is this force that interrupts and imposes its violence on the imagination to enforce a halting status in order to allow the subject to comprehend its own limit. The same goes for the dynamic sublime, in which the machine is overwhelmed by the immeasurability and uncontrollability of the data that it has to process—here, horror is felt, and respect (*Achtung*) emerges,

[1] Immanuel Kant, *Kritik der Urteilskraft*, Frankfurt am Main: Suhrkamp Verlag, 1790, §26.

namely, the subject is elevated to a moral and religious ground.

We will see here the abstraction shared by both the mathematical and the aesthetic sublime; this is why it is necessary to see this only as an analogy since the question of freedom is crucial to the analytics of the sublime. And I think that Schiller's re-articulation of the Kantian question is important for our discussion. While Kant wrote about the beautiful and the sublime in relation to nature, he did not write about works of art, at least with any thoroughness. On the other hand, Schiller, Schelling, and Hegel took up the concept of the sublime and attributed it to art in general. For Schiller, the passage to the *Unendlich* or the *Unbegrenzt* through aesthetics is the realization of "sublimest humanity," in which the play drive (*Spieltrieb*) overcomes the determination of the material drive (*Stofftrieb*) that is dominated by the sensuousness and the determinability of the formal drive (*Formtrieb*) that is, in turn, dominated by rationality. Art is not, therefore, something that bridges the two since the gap itself is infinite, but rather art is a means by which an aesthetic living form sublates the contradiction between the sensuous and the formal. However, to do so, it preserves both the sensuous and the formal by rendering them *contingent* before elevating them to *necessity*—an operation that prefigures Hegel's notion of *Aufhebung*:

> aesthetic unity, an actual union and interchange between matter and form, passivity and activity, momentarily takes place, the compatibility of our two natures, the practicability of the infinite being realized in the finite, hence the possibility of sublimest humanity, is therefore actually proven. (Schiller, 1983, p.189).

For Schelling, the unity of the infinite in the finite is the unity of Nature and Spirit, like the Spinozist *Natura naturans* and *Natura naturata,* which constitute the activity and expression of nature. The contradiction consists of the confrontation between the finite and the infinite, contingency and necessity, the condition that the imagination must confront and simultaneously reconcile. Like in Greek tragedies, contradiction is presented as a necessity, and the heroic act overcomes such a contradiction, producing the feeling of the sublime. Oedipus, the intelligent man who solved the sphinx's riddle, couldn't escape the destiny he was already told, but in accepting his destiny, he blinded his eyes and went into exile. The Greek tragedy functions according to the reconciliation of contingency and necessity, the finite and the infinite. Artistic creation relies on this possibility to create a contradiction as a necessity and gives wing to the imagination to discover the real as its freedom.

With the Kantian language formulated above, we can also attempt to understand the difference between aesthetic imagination in the East and the West. While I can only do so briefly and superficially, I would like to mention it here because, as a comparison, it exhibits a very different model from Greek tragedy (Hui, 2021).[2] As we know, in Kant, there is an epistemological difference between the phenomenon and the noumenon. Human experience can only penetrate the phenomenon instead of reaching the noumenon. This is precisely because human beings only have access to sensible intuitions, not intellectual intuitions, which Kant attributes to God. The Chinese New Confucian philosopher Mou Zongsan, equally the translator of Kant's three *critiques*, has attempted to show that this limit that the critical philosophy imposes is the demarcation between Chinese philosophy and Western philosophy since if Post-Kantian philosophy has to reject the speculation into the noumenon in favor of science, Chinese philosophy since its beginning is the investigation of the noumenon and the cultivation of how the intellect passes into the noumenon (Mou, 2006). It is not our priority here to justify Mou Zongsan's claim. Still, if we follow his analysis of Neo-Confucianism (between the Sung dynasty and the Ming dynasty), he was not without reason to claim that the noumenon or infinity is the pursuit of Chinese philosophy and art.

What does this mean to our inquiry into artistic creation and imagination? Psychologists have tried to claim that the difference between Zen Buddhist painting and western painting is that Zen painting focuses on the ground. In contrast, western painting, whether still life or landscape, emphasizes the figure. Here the figure and ground concepts are from Gestalt psychology. This comparison is widely repeated, but it is not without problem regarding philosophical precision because there are different understandings of the ground. Eastern paintings, especially landscape paintings and Zen Buddhist paintings, are passages to the noumenon, meaning that by which the imagination can spring into the infinite.

[2] In *Art and Cosmotechnics*, Hui tried to show a different recursive logic, which one could find in Chinese landscape painting and Daoist thought.

This passage from the finite, which is the painting, into the infinite, characterizes the spirit of artistic creation in the East. If we look at a Chinese landscape painting, it doesn't reflect the perspective of the landscape, it doesn't follow any projective geometry but rather attempts to produce a passage beyond the image. What does it mean to pass from the finite to the infinite in contrast to the inscription of the infinite in the finite? We are talking about two passages here, but both these passages have taken the imagination beyond the image, while in Eastern thinking, such an inscription is not presented as a contradiction but necessarily a leap with which the imagination joins the harmony of the cosmos. And it is in this perspective that we can talk about *the varieties of experience of art* (Hui, 2023).

No matter how powerful it is, artificial imagination lingers on the mathematical infinity. Both Leibniz's infinitesimal and Cantor's transfinite are mathematical and metaphysical concepts that renew the concept of form in art and philosophy, allowing expressions beyond human senses into an infinite, which is nevertheless numerical, which we can identify in modern computing through recursive algorithms. However, in art, the relation between the finite and the infinite takes another form of expression. We would like to suggest reconceptualizing the question of creativity after computation, that is, to look for creativity beyond computation via computation. And artificial imagination in this context is not about the production of images but rather the passage beyond the image.

§4. Aesthetic Education after Computation

Someone may challenge the above position by arguing that we are simply defending human faculties against artificial faculties. Schiller was, after all, a humanist of his epoch, and by taking up Schiller and, by extension, Kant's inquiries, are we not following the same historical path? First, the contrary is true because there are no human faculties to defend; secondly, our point of departure is the limit and weakness of the human faculties. What would appear problematic today is to oppose the two faculties as if one is the simulation or imitation of the other; instead, we have to recognize the *conflict of the faculties* and, as such, think *organologically*. That is to say, it is not to show which imagination is stronger and more powerful but to speculate as to how the organological unity of imagination may allow us access to the Unknown.

Therefore, what we have tried to do above is to clarify the potential and the limit of artificial imagination. We showed that the imagination already relies on and is conditioned by a fourth synthesis, following the model laid down by Kant, and that the imagination is always already artificial. This implies an organology of imagination as a task to reflect on the question of creativity after computation. We also looked into the nature of "artificial imagination." Finally, we tried to show different ways of thinking the relation between the finite and the infinite, in mathematics, in art, and in Eastern thinking. With these differences in mind, we suggest avoiding an opposition between machine and human and equally avoiding a mystification of machine learning or artificial imagination, but rather taking this opportunity to re-elaborate on aesthetic education, as was once raised by Schiller.

The question is: How is artificial imagination as part of the *comprehensio aesthetica* able to open a new way to overcome the tension we mentioned above? Should we admit that artificial imagination, with its increasing power, is going to impose a stronger determination on us and limit the capacity to act? Art based on technology and media attempt to bring a new form of visual and audio experience to the public, but have they succeeded in bringing this experience beyond images? Or are they still misguided by the desire to create more and more images and bring forward richer sensual experiences?

I think François Lyotard saw a similar problem almost forty years ago when he developed the discourse around the postmodern. In an article titled "After the Sublime, the State of Aesthetics," Lyotard claims that "for the last century, the arts have not had the beautiful as their main concern, but something which has to do with the sublime" (Lyotard, 1991, p.135). For Lyotard, the sublime is central to modernism and to the avant-garde because the turn towards the non-figural in modern painting and the desire to transcend objective rules in the avant-garde has its root in an attempt to grasp the infinite in the finitude of the work of art. It is the reason for which the unpresentable (*Undarstellbar*) of the *aistheton* constitutes the core idea of the *avant-garde*; for example, in the timbre and the nuance in music, one finds "a sort of infinity, the indeterminacy of the harmonics within the frame determined by this identity" (Lyotard, 1991, p.140) or the "here and now" in the painting of Barnett Newman. The Unpresentable activates the confrontation between reason and imagination, leading to the unrepresentable (*Unvorstellbar*). Lyotard, however, turned away from the avant-garde to question the status of art after the sublime, that is to say, after the philosophy of subjectivity. Lyotard's answer is to turn to the thing, the thing that is an immaterial materiality. This subject fascinated Lyotard in the 1980s and led to the landmark exhibition *Les Immatériaux* (1985), dedicated to the new sensibility which accompanies the new materiality, notably what we might call digital technology and nanotechnology today. It was also during this occasion that Jacques Derrida, Bruno Latour, and many philosophers, as participants in the exhibition, used a computer to write for the first time.

> The paradox of art 'after the sublime' is that it turns towards a thing which does not turn towards the mind, that it wants a thing, or *has it in for* a thing which wants nothing of it. After the sublime, we find ourselves after the will. By matter, I mean *the Thing.* The Thing is not waiting to be destined, it is not waiting for anything, it does not call on the mind. How can the mind situate itself, get in touch with something that withdraws from every relationship? (Lyotard, 1992, p. 142).

This passage from Lyotard may sound like the so-called object-oriented philosophy of today. However, it was not Lyotard's aim to develop in such a direction. Art after the sublime, therefore, directs away from the mind to the thing, to the immaterial materiality, to the active agency of the thing; at the same time, the mind will have to situate itself in order to be in relation with the thing—a task that Schiller invokes when he talks about the education of sensibility (*Ausbildung des Empfindungsvermögens).* The education of sensibility is enabled by the new materiality and the new operations of machines, and it is in this possibility that we ask what we might mean by creativity after computation.

References

Chaitin G (2005) Leibniz, Information, Math and Physics. http://arxiv. org/abs/math/0306303.

Dreyfus H (1972) *What Computers Still Can't Do: A Critique of Artificial Reason*. New York: Harper & Row.

Heidegger M (1990) Kant and the Problem of Metaphysics. (Richard Taft, Trans.). Bloomington: Indiana University Press.

Hui Y (2016) *On the Existence of Digital Objects*. Minneapolis: University of Minnesota Press.

Hui Y (2019) *Recursivity and Contingency*. London: Rowman & Littlefield.

Hui Y (2021) *Art and Cosmotechnics*. Minneapolis: University of Minnesota Press.

Hui Y (2023) On the Varieties of Experience of Art. *Theory Culture and Society*, DOI:10.17.7/02632764221147673

Kant. I. (1996). *Critique of Pure Reason*. (Werner S. Pluhar, Trans.). Indianapolis: Hackett.

Kant I (2007) *Critique of Judgment*. (James Creed Meredith and Nicholas Walker, Trans.). Oxford: Oxford University Press.

Leibniz G W (2014) *Monadology*. In *Leibniz's Monadology: A New Translation and Guide*, ed. Lloyd Strickland, Edinburgh: Edinburgh University Press.

Leibniz G W (1989) *Discourse on Metaphysics and Other Essays*. (Daniel Garber and Roger Ariew, Trans.). Indianapolis: Hackett.

Lyotard, J-F. (1991). *The Inhuman: Reflections on Time*. (Geoffrey Bennington and Rachel Bowlby, Trans.). Stanford, CA: Stanford University Press.

Mou Z (2006) *Intellectual Intuition and Chinese Philosophy* (智的直覺與中 國哲學). Taipei: Taiwan Commercial Press.

Nietzsche F (2001) *The Gay Science*. (J. Nauckho, Trans.). Cambridge, UK: Cambridge University Press.

Schiller J C F (1983) *On the Aesthetic Education of Man in a Series of Letters*. (E. M. Wilkinson and L. A. Willoughby, Trans.). Oxford: Oxford University Press.

Stielger B (2010). *Technics and Time 3: Cinematic Time and the Question of Malaise.* Stanford: Stanford University Press.

Invited paper

COMPUTATIONAL CREATIVITY OR AUTOMATED INFORMATION PRODUCTION?

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A work of art does not contain the least bit of information.In contrast, there is a fundamental affinity between a work of art and an act of resistance. It has to do with communication and information as an act of resistance.

Gilles Deleuze*

Abstract:

Algorithms and automated learning systems have been successfully applied to produce images, pieces of music, or texts that are appealing to humans and that are often compared to artworks. Computational technologies are able to find surprising and original solutions–new patterns that humans cannot anticipate– but does this mean we ascribe to them the kind of creativity that is expressed by human artists? Even though AI can successfully detect humans' preferences as well as select the objects that satisfy taste, can we ascribe to them the capacity of recognizing the intrinsic value of artworks? To answer these questions, I am first going to explain the kind of creativity that is expressed by contemporary predictive systems, then, in the second part of this paper, I will try to show the difference between the creativity of algorithms and the creativity of artists by expanding on Deleuze's reflections.

Key words: computational creativity, machine learning, information, inequality, art.

Recent advancements in computer programming and machine learning have led to the production of systems that exhibit creative behavior: they are able to find unpredictable, original, and valuable solutions to given problems. These programs have been successfully applied to produce images, pieces of music, or texts that are appealing to humans and that are often compared to artworks. Examples are software for generating music (Cope, 2006; Dubnoy & Surges, 2010; Blackwell et al., 2012), artistic images (Boden & Edmonds, 2009; McCorduck, 1991; Audry, 2001; Romero & Machado, 2008), and literature and poetry (Perez, 2017; Veale, 2012; Gervás, 2001). Moreover, machines seem capable of evaluating cultural products in accordance with human preferences to satisfy individual tastes, so they appear capable of aesthetic judgment (Fisher, 2022; Goree, 2021; Galanter, 2012; Romero et al., 2012). Algorithms can find surprising solutions and propose unanticipated, interesting patterns, but does this justify ascribing to them the kind of creativity that is expressed by human artists? Even though AI can successfully detect humans' preferences as well as

* "What is the Creative Act?" in Deleuze 2006: 322.

select the objects that satisfy taste, can we ascribe to them the capacity of recognizing the intrinsic value of artworks? To answer these questions, I am first going to explain the kind of creativity that is expressed by contemporary predictive systems, then, in the second part of this paper, I will try to show the difference between the creativity of algorithms and the creativity of artists by expanding on Deleuze's reflections.

Inductive learning

As I suggested in *Le jeu de l'induction: automatisation de la connaissance et réflexion philosophique* (Longo, 2022), AI is the result of the redefinition of inductive reasoning within the pragmatic framework of decision theory. In particular, I explained how Bayesian methods for statistical inference play an essential role in modeling the learning process through which humans produce and select predictive hypotheses. I showed how the Bayesian conception of inductive reasoning has led to programming machines capable of producing and adapting predictions about the environment in such a way as to suggest increasingly rewarding strategies for interaction.

Bayes' formula for updating beliefs allows us to precisely calculate how different hypotheses are historically selected and how beliefs converge toward predictions that must be collectively considered more reliable (more probable) for making decisions in an uncertain (partially known) environment.[1] For example, the belief that the received sensory information associated with smoke is followed by the sensory information associated with fire entails the decision of escaping, so it is the pragmatic efficacy of the predictive hypothesis that explains why it has been selected for regular use: anybody ought to consider it highly probable since it increases one's chances of survival. Accordingly, one can expect that any individual sharing the set of hypotheses that has been historically selected will behave in the same way when specific patterns of information are received. From this standpoint, scientific hypotheses are reliable predictions about the states that will follow a presently observed situation, and they allow us to pursue rewarding strategies–for instance, applying technology in ways that adapts to the expected behavior of natural systems. Hence, technological progress is the result of the inductive process during which degrees of belief in hypotheses are updated by integrating new observations as well as the results of previous strategies for interaction. We could say that technological advancement is at the same time the effect of the development of knowledge and the optimization of the practices that depend on it. Inductive reasoning is then a process that can be modeled as a recursive set of operations for calculating the degree of belief that hypotheses objectively deserve with respect to the newly available information. The technical optimization of this heuristic procedure is the aim of AI.

The first to envision the possibility of automatizing the Bayesian method for statistical inference was Ray Solomonoff in the 1950s. Even though predictive technologies have evolved considerably since this first attempt, the intuition that phenomena can be conceived as computable patterns of information sets the conditions for today's algorithmic modeling and contemporary AI. According to Solomonoff, any scientific hypothesis can be conceived as an algorithmic rule for producing an ordered series of values. A scientific hypothesis is then a recursive function (algorithm) that produces a series of values by repeating a specific operation on the result of its previous operations. Hypotheses can be automatically produced by a Turing machine that explores a data set; the goal is to find the function that can generate the values contained in the data set as an ordered series. The selection of the function–among those that might be suitable for the purpose–that is more likely to model the unfolding of an event allows the machine to make predictions about the values that have not been observed yet–for instance, the new cases of contagion during a pandemic, or the trajectory and the intensity of a tropical storm.

To understand the importance of Bayesian methodology, we must note that a plurality of different predictive hypotheses can be found by a Turing machine that explores a given dataset. However, it is essential to calculate the respective probability of the different hypotheses. To do so, Solomonoff introduced the notion of algorithmic probability[2] to au-

[1] About this pragmatic account of inductive reasoning see Ramsey (1931). For the application of Bayesian methods to induction within the framework of decision theory see De Finetti (1974) and Savage (1954, 1967).

[2] Algorithmic probability measures the degree of belief to be attached *ex ante* to predictive hypotheses with respect

tomatically calculate the degree of belief to be attached to the different hypotheses obtained through the analysis of the available data. Starting from this initial probability distribution over different hypotheses, Bayes' formula is applied to recalculate the degree of belief to be attributed to each by taking new information into account, including the effective efficacy of their predictions.

Today the criteria for establishing the initial probability distribution of the different hypotheses that are supported by the available evidence are far more sophisticated. However, it remains the point to establish the respective probability of the patterns that can be discovered in the data in such a way as to calculate all the possible transformations of a phenomenon as well as to recognize all its possible occurrences. For example, given a dataset of images of cats, the goal is to find the algorithm that can produce the whole series of items that fit the category by identifying the pattern of constant relations that characterize any possible occurrence of the animal. Moreover, human agents can be assigned to categories (different strategies that are meant to maximize utility) by observing past decisions to predict the future as if agents were acting according to a rule that associates incoming information with specific reactions or outputs.

Thanks to their computational power, technologies can take into account an amount of information that our brain cannot manage in order to calculate and recalculate the respective probability of a large number of hypotheses, thus increasing the chances of selecting the more reliable.[3] It is important to note that, as Leonard Savage (1954) stated, humans cannot make optimal decisions when the number of future possible scenarios increases beyond a certain limit without the support of computational devices. In other terms, humans can successfully apply Bayes' rule only when the problem being solved requires the comparison of a small number of hypotheses, the respective probability of which depends upon pieces of information that are not only known to be pertinent but also easily available.

Automated inductive systems, like Solomonoff's, have been developed to help humans with decisions that depend on the realization of future events, the probability of which cannot be easily determined by relying on the computational power of our brain, (i.e., in all the cases in which we do not dispose of a set of preselected probable predictions that can be updated by preselected and accessible specific pieces of information). Regarding this, it is important to note that the long process of evolution led humanity to select and culturally transmit the most useful and reliable hypotheses to orient decisions within recurrent and common problems–for instance recognizing objects and interacting with them to obtain the desired results. (To an extent this is also true of animals, although behavioral adaptations are mostly genetically encoded rather than culturally transmitted.) Humanity shares common knowledge, a coherent set of highly probable beliefs that grounds regularly adopted practices, i.e., behaviors that have proven useful in obtaining results that are essential for surviving in the natural environment as well as in the social one. Such beliefs are the outcome of the very long collective "computation" which comprises the process of adaptation during which inductive Bayesian learning progressively led to the selection of the expectations that are more useful for orienting decisions and establishing rewarding strategies of interaction. As Solomonoff explains:

> *My general conclusion was that Bayes' theorem was likely to be the key. That a person was born with a reasonably good built in a priori probability distribution. The person would then make predictions and decisions based on this distribution. The distribution was then modified by their life experience. The initial 'built-in' distribution was obtained by organic evolution. There was a strong selection in favor of organisms that made decisions on the basis of 'good' a priori probability distributions. The organisms making poor decisions would tend to have fewer descendants.*

Hence, the condition for the development of AI is the reproduction of the results obtained within the evolutionary process under the assumption that it can be modeled as if humans (and living beings in

to the complexity of the algorithm that describes them. According to Solomonoff, longer rules are less probable than shorter or simpler rules.

[3] By comparing a partial number of hypotheses, we cannot make sure of selecting the best one. To do so we need to evaluate the respective probability of the totality of the hypotheses that are supported by the available pieces of evidence. Even though it is almost practically impossible to find all the correlations in a data set, a machine surely is more efficient than us in exploring data.

general) were producing, selecting, and updating hypotheses according to the Bayesian method for inductive statistical learning. The advantage offered by predictive machines is that, thanks to their capacity to explore a larger amount of information in a relatively short amount of time, they can introduce hypotheses that depend on patterns of information that humans have not taken into account. Moreover, they are faster and more efficient in updating the probability of prediction in such a way as to accelerate the learning process as well as the revision of the strategies of interaction.

Despite the difficulties implied by the project of automatizing human inductive learning to obtain an improved algorithmic version of it (which is strong AI), much progress has been made, and present systems exhibit creative traits that are related to the capacity of autonomously producing and selecting hypotheses that are at the same time practically useful (they lead to satisfactory modes of interaction) and surprising (they cannot be predicted). The learning process described can be considered creative since, even though it can be modeled according to computational procedure, its unfolding cannot be fully anticipated since the production and the selection of reliable beliefs (as well as the modes of interaction that they entail) depend upon the arrival of new or unknown information. Consequently, hypotheses considered highly probable in the past might be collectively taken to be unlikely at a later time and replaced by new ones that were completely unforeseen before. On the one hand, this confirms the idea that inductive certainty is not possible (new observations can always force a modification in the probability of predictions or the degree of belief attached to them). On the other hand, this suggests that modes of interaction can be indefinitely reinvented to give rise to more complex and more adapted systems of organization in just the same way as natural evolution. It is by observing the way in which knowledge and practices evolve toward increasing complexity and efficacy that the model of Bayesian inductive learning has been introduced. This model of the human learning process provided the hypothesis that enabled the possibility of computationally reproducing and technologically improving the capacity to evolve knowledge. Though computational technologies are the creative result of human inductive learning, they are also tools for optimizing this same process to enable new ways of interacting and obtain previously unavailable outcomes.

The evolution of information technology and the technology for information production

Contemporary AI is the consequence of human creativity, the result of the unpredictable process of inductive learning by which more satisfactory and complex models of physical systems are introduced so as to enable new and more rewarding modes of interaction. In particular, AI is a technology that improves and optimizes interactions among humans by providing them with the possibility of accessing and exchanging relevant information more quickly and more efficiently. In addition, it offers rapidly updated forecasts that facilitate the revision of plans of action in a complex and changing social environment.

What makes AI creative is the fact that it is based on a computational model of the cognitive process that is responsible for human’s capacity of evolving knowledge and practices. The creativity of AI would prove that it is based on a correct computational model of the procedure of human learning, a procedure that machines can further develop in order to contribute to the production of knowledge. Hence, the question is not whether humans compute in the same way as machines ,but whether computational technology is satisfactory with respect to the goal of improving problem-solving strategies. The problem lies not in determining whether AI simply simulates intelligent and creative behavior or is itself genuinely intelligent and creative, but in ascertaining whether creativity should be defined as the progressive innovation and selection of practices, the value of which is relative to expected returns. Accordingly, what I would like to put into question is the effective value of the compulsive process for producing novelties, a process that is justified as expressing the creative tendency of life toward increasing complexity and order while imposing a criterion for judging that is grounded on the desire of guaranteeing unlimited economic growth. To explain why this question is pertinent, I will demonstrate the complicity between the hypothesis of computational creativity and the economic value of innovation within the framework of the current market of information.

The perspective according to which computation is the key for unleashing the creative power of natural evolution by assuring the acceleration of the production of unforeseen valuable novelties is coherently and clearly explained by Ray Kurzweil, author of five books on computational creativity and currently a director of research on AI at Google.[4] A pioneering inventor in the field of pattern recognition, Kurzweil introduced the system for optical character recognition (OCR) and created software that analyzes the works of classical composers in order to synthesize its own songs in similar styles. He describes natural evolution as the unpredictable production of "patterns of increasing order" (2005, p. 4) and computational modeling as the advance that allowed humans to uncover the mechanism that is responsible for the emergence and the selection of new valuable solutions to the problem of assuring the survival and the replication of the species.

By modeling natural evolution as if it were a computational process[5] that unfolds through the interaction among genetic algorithms[6] it is possible to observe not only how stable patterns of information emerge and give rise to organization, but also how these patterns of organization evolve toward increasing complexity and order. Here, information is defined as "a sequence of data that is meaningful in a process" like "the bits in a computer program"; complexity "is the minimum amount of meaningful, non-random, but unpredictable information needed to characterize a system or process" (2005, p. 17); and order is "the measure of how well the information fits the purpose" (2005, p. 18). For instance, a random sequence of bits does not contain any real information (meaningful data), it is not complex (even though it is unpredictable, it can be substituted by the repetition of the instruction to "generate a random sequence"), and it is not ordered since it does not fit any purpose (it does not encode instructions for solving problems). A telephone book, on the contrary, contains a lot of information and exhibits some degree of complexity (the program to produce it is quite long and articulate), but it is not ordered (it does not accomplish any task by itself even though it can be used by more ordered systems). An example of an informative, complex, and ordered sequence of information is DNA: it is not compressible and it is a highly efficient program that codes for a large variety of tasks and for a potentially infinite and unpredictable series of meaningful information (phenotypes). DNA code can be seen as an incredible increase in order with respect to inorganic patterns of organization since it meets the goal of assuring not only the reproduction of living organisms but also their evolution (the emergence of novelties that express higher degrees of fitness). This capacity of a sequence of information (a coded program) to produce new information (unexpected valuable outputs) is a symptom of its order: "a completely predictable process has zero order" (2005, p. 44) since all the information that it can produce can be analytically deduced from the knowledge of the rule that generates it.

According to Kurzweil, order measures the progress of the types of organization that emerge within the evolutionary process. As we have said, a sequence of information is ordered when it fits a purpose; hence more ordered structures are more successful than less ordered structures, and for this reason, the former are selected and transmitted whereas the latter disappear. Natural selection operates to transmit and reproduce more ordered or fitter patterns of information but also more "adaptable" rules (rules that can modify themselves) in such a way as to assure the diffusion of living beings within an unpredictable or uncertain environment (peopled by similarly evolving entities). As Kurzweil notes, to quantify order, "we need a measure of 'success' that would be tailored to each situation" (2005, p. 18); we need to establish a goal to quantify the efficiency of the treatment of information embodied by systems–hence a "utility function" (ibid).

We can say that the "purpose" of living beings like plants and animals is reproduction, i.e. the propagation of the species. By contrast, the present goal for humans, who are evolving through technology, is

[4]With his team of AI programmers, Kurzweil is studying ways that computers can process, interpret, understand, and use human language in everyday applications. Kurzweil received the 1999 National Medal of Technology and Innovation, was elected a member of the American National Academy of Engineering in 2001, and received 21 honorary PhDs.

[5] As we said, it does not matter if natural evolution is really a computational process but that it can be correctly modeled as a series of results that can be generated computationally, and of course, this does not mean that the consequences are analytically deducible from the premises, but that the rules of interaction among atomic elements allow for the emergence of more complex wholes, the interaction of which is the condition for further unpredictable emergences.

[6] Genetic and evolutionary algorithms are rules for finding solutions to a problem of interaction, the conditions of which are specified even though the result is unpredictable. Like in Conway's *Game of Life*, ordered patterns might emerge depending on the initial conditions.

more complicated. To measure technological progress or the increasing efficiency of our computational devices, Kurzweil proposes that we consider the economic return that innovations provide within an ongoing and selective competition. As he claims, “in the evolutionary process of technology development, we could assign a measure of economic success” (ibid), and “economic imperative is the equivalent of survival in biological evolution” (Kurzweil, 2005, p. 48). Economic growth allows for investing increasing amounts of resources into innovation by providing larger parts of the population with cheaper but more powerful means of treating information so as to improve decisions and, as a consequence, expected returns. As Kurzweil notes, the major positive change is that “we are progressing toward the new knowledge-based economy” (2005, p. 48): not only do information technologies support today's economic growth, but they also provide people with an increasing number of relevant and updated predictions that allow them to make more efficient decisions and to organize interaction and transaction in an increasingly satisfactory way. For instance, platforms and networks offer an infrastructure for rapidly collecting desired information, and they allow for the use of this knowledge so as to optimize outcomes by connecting buyers and sellers or producers and consumers, but also by matching preferences and goods or interest and content.

Economy of information

Today, **i**nformation is a commodity we all consume and the good that we produce by using it. Since anything can be computationally modeled as a pattern of information–physical objects, images, texts–whatever we produce or consume is information. Moreover, we are patterns of information ourselves: a series of decisions (outputs) that can be modeled with regard to our capacity to satisfy preferences, or maximize utility (to get the information we are looking for), and that depend upon beliefs or hypotheses about the information patterns with which we interact. As a consequence, the observation of decisions generates information about preferences and beliefs that can be manipulated by providing specific pieces of information in order to obtain the desired reactions.

Agents are known and treated exactly as physical systems that can be stimulated in specific ways to produce the intended behavior. This is consistent with the hypothesis that outputs are entailed by a specific computation that operates on inputs. Such a view regarding the information patterns (algorithmic rules) that human actors instantiate allows AI to select the information that is supposed to produce the desired results: (1) to maximize the agent's utility (how to choose, in a few seconds, the restaurant that satisfies all our criteria without Google? How to find the video we are interested in without the YouTube algorithm? How to be trendy, fashionable, and enviable without Instagram? How to find love without Tinder?), but also (2) to influence beliefs and preferences by suggesting new predictions and available future situations (for instance, to get a more satisfactory product or to avoid an unforeseen danger).

By consuming information we also produce information that can be used to optimize consumption by orienting preferences, beliefs, and decisions toward increasing order in the overall digital organization: data are used to reshape strategies in order to increase the performance of the network. This continuous optimization of strategies (including the introduction of technological innovations) is expressed by the creation of new and valuable (more ordered) information, and such production is substantially accelerating together with the economic returns that can be reinvested in further research and developments. This acceleration of the information industry makes commonly shared information or common knowledge rapidly obsolete; hence it generates a situation of uncertainty[7] that motivates the increasing use of intelligent devices that are more and more efficient in their treatment of information.

As Joseph Stiglitz noted, the economy of information surely favors economic growth and larger returns, even though it also exacerbates inequalities: while the richest become richer, the poorest, even equipped with information devices that only the richer could have afforded ten years ago, are getting poorer. Research into new information allows for larger returns and motivates investment toward developing sophisticated technologies for data collection and treatment. However, in order to be advanta-

[7] Uncertainty characterizes a situation where the respective probability of different hypotheses cannot be correctly calculated because the available information is not only incomplete but also ambiguous. For instance, the decisions that are made by treating new pieces of information cannot be correctly anticipated by agents who do not have access to such data.

geous, the costly supplementary information that is acquired must be used privately, otherwise it wouldn't grant the chance of making decisions that are more efficient than decisions made according to free and public knowledge. Accordingly, if a business for information production exists, this indicates that newly produced information has value: it can be sold since it allows the buyer to make decisions that are more rewarding than those made by actors who do not have equal access to relevant or updated information. In particular, new and valuable information concerns hypotheses about the future decisions of other agents; hence it allows for the development of strategies that take into account what the majority cannot correctly anticipate. So, it is the information offered by users that allows service providers to produce updated predictions to be sold to the agent who can afford to buy the most updated predictive models. However, the accelerating production of new (surprising) information (new strategies as well as new beliefs and computational devices) represents an augmentation of uncertainty for all agents who do not have access to it and who are forced to increase time spent online if they want to be able to make a few rewarding decisions.

We can say that the mechanized industry for information is motivated by the uncertainty that it reproduces in an economically productive loop: we have to consume information by using technological devices in order to orient decisions in a rapidly changing social environment; however, by consuming information, we generate data that are privately used to introduce new strategies that contribute to the unpredictable modification of the conditions with respect to which common knowledge was informative. As a consequence, we are all information consumers, and the economically productive consumption of new information is fueled by the private exploitation of the data produced through information consumption. Yet, the returns enjoyed by the more informed are always larger than those of the less informed: while the former can continue investing in research, the latter are in a situation of increasing uncertainty that reduces their chances of maximizing utility.

Information and non-information

Rather than a creative global process evolving toward increasing order and offering new chances and opportunities, the global market appears as a mechanism for industrially reproducing information by forcing its consumption with no other end than keeping the same dynamic going. This consists in constantly producing new information that itself can be used to produce more valuable or consumable information while reproducing the inequality of access to this good. (Recall that it is the asymmetry of information that determines its value; nobody would pay to get information that everybody knows.) From this perspective, novelties are but information that can modulate beliefs, behaviors, and identities in such a way as to optimize the economic efficiency of the global market. While the value of any agent is measured with respect to the order or the efficacy of her schema for decision-making, the value of the whole system is measured with respect to its productivity in terms of information production. Everyone is continuously forced to change and to adapt as a result of their obedience to the normative logic of evolution, or the normative logic of competition among information patterns or rules for treating information, a logic that operates through the creation and the selection of increasingly ordered series. When, in his last writings, Deleuze sketched a portrait of the society of control, this is what he had in mind.

In the famous "Postscript on control societies" (Deleuze, 1995, pp. 177-182), Deleuze announces the crisis of the disciplinary organizations described by Foucault and the rise of a new form of control that is "inseparable from variations, forming a system of varying geometry whose language is digital" (Deleuze, 1995, p. 178). Rather than imposing fixed roles, behaviors, identities, and beliefs, control imposes "a modulation, like a self-transmuting molding continually changing from one moment to the next" (ibid). Within this open system, individuals are no longer the atomic elements composing homogeneous masses, but "dividuals" (meaning they are divisible): they are patterns of information defined by beliefs and preferences, while "masses become samples, data, markets, or banks" (Deleuze, 1995, p. 180). As determined by learning computational rules that operate recursively by adapting to incoming information "control man undulates, moving among a continuous range of different orbits," where "surfing has replaced the old sports" (ibid). This new form of modulating control is associated with "a third generation of machines, with information technologies and computers" (ibid) and it is rooted in a mutation of capitalism which is "directed toward metaproduction," the diffusion of services rather than the production of objects. If today's production concerns information insofar as any object can be reduced to a more or less valuable pattern of information, metaproduction is the development of the technological infrastructure that allows for modulating actors' behaviors productively. Metaproduction concerns the development of platforms, networks, and apps. Hence, the "creativity" of systems is expressed by the unpredictable unfolding of ever new solutions for optimizing the exploitation of information patterns in order to produce new valuable information to be consumed. If the process allows for economic growth, it also constitutes an optimization of the global machine to which anybody is subjected and by which anybody is modulated as an information flux.

In the conference "What is the creative act," Deleuze stresses the relation between control and information while defining information as "the controlled system of the order-words used in a given society" (Deleuze, 2006, p. 322). To the computational creativity of the global machine for information production and its imperative to constant innovation, Deleuze opposes artistic creation: "art has nothing to do with communication" (2006, p. 322) and an artwork "does not contain the least bit of information" (ibid). Artistic creation is defined by Deleuze as an act of resistance against communication and information.

Deleuze explains that this resistance to information is shared by artistic creativity and people's struggle for freedom; in fact, both are calls on "a people that does not exist yet"(2006, p. 324). Rather than acceptance of being transformed to serve the system's will of increasing productivity and order by exploiting and reproducing knowledge asymmetries (ignorance), this struggle consists in affirming a mode of existence that challenges the normative criteria for evaluation based on order and economic efficacy. If, according to Deleuze, art is a struggle against death and a call on a people that does not exist yet, then artistic creation is the affirmation of the right and the intrinsic value of individuals that will not accept being formed and modulated according to the exploitative strategies of the industry for information production, an industry that basically reproduces ignorance (as the infinite need for acquiring information). That art resists death means that it resists the exclusion of modes of individuation that do not meet the rational criteria of order (economic efficacy). In other words, artistic creation is a way of responding to problematic conditions that are not those that determine the solutions provided by the actual global market organization. Therefore, rather than being an efficient solution to the problem of assuring unlimited economic growth, artistic creation is the result of a refusal to recognize this problem as important, as the issue that everybody should be engaged in solving. While we have the impression of taking part in the unfolding of a dialectic that allows for overcoming contradictions by finding solutions for improving interactions, we are all submitted to the imperative of fueling the monopolistic ambition of the industry for information production, an ambition that culminates in the dream of incorporating anything into the unique computational system of a global metaverse.

As Deleuze noted in *Difference and Repetition*: "contradiction is not the weapon of the proletariat but, rather, the manner in which the bourgeoisie defends and preserves itself, the shadow behind which it maintains its claim to decide what the problems are" (Deleuze, 2001, p. 268). The differences that the creative act aims to affirm are not pieces of "information that make the difference" or surprising patterns that emerge as better solutions for improving the growth of the industry for information production (solutions that have a value since they satisfy preferences and the compulsive desire for consuming information that is always new). On the contrary, the differences produced by art are propositions and experiments that depend upon problems (ideal conditions) that cannot be reduced to that of economic productivity. For this reason, artistic creation is an act of resistance against death, the death to which all the producers of forms that are not functional to the progress of information technology are condemned. For this reason, artworks are eternal calls on a people that is still missing, the people who will finally exist as the solution for a problem essentially different from the ideology of unlimited economic growth.

Returning to computational artists and critics: it is evident that they are creative insofar as they produce new information that satisfies human tastes and preferences, which algorithmic systems are so good at detecting, classifying, and manipulating. However, it is also evident that these machines are compelled to be creative according to the imperative of producing new patterns of information for consumption; they are themselves patterns of information (programs) whose value is relative to ever-changing environmental conditions, which means they will be rapidly replaced by more efficient and powerful machines.

Algorithms can be considered to be creative and to be "artists" only when art is reduced to the production of new information–to the production of rapidly obsolescent merchandise. Algorithms can be considered creative only under the deadly exclusion of other modes of existence that are not determined by the aim of matching the criteria of order that measure the value of information in order to maximize utility. Rather than being consumable information, art is the eternally valid call for another form of organization. Artistic products are not patterns of information whose value can be measured merely with respect to the satisfaction of tastes: artworks are what resist the reduction of everything to information patterns that are judged and evaluated with respect to the way they fit the purpose of contributing to the infinite unfolding of the capitalist system, which pretends to be able to produce all differences from within, but which does not recognize the right of any other system of organization to exist.

References

Audry S (2021) *Art in the age of machine learning*, MIT Press.

Blackwell T, Bown O, Young M (2012) Live algorithms: Towards autonomous computer improvisers. In *Computers and creativity,* eds J. McCormack, M. d'Inverno, 147–174. Berlin: Springer https://doi.org/10.1007/978-3-642-31727-9

Carnap R (1945) Two concepts of probability. *Philosophy and Phenomenological Research, 5*(4): 513–532.

Boden M A, Edmonds E A (2009) What is generative art? *Digital Creativity,* 20(1-2):21–46 https://doi.org/10.1080/14626260902867915

Boden M A (2013) *The creative mind: Myths and mechanisms*. Routledge. https://doi.org/10.4324/9780203508527

Cope D (2006) *Computer models of musical creativity*. MIT Press.

De Finetti B (1974) *Theory of probability: A critical introductory treatment*. New York: Wiley.

Deleuze G (2006) What is the Creative Act? In *Two regimes of madness,* ed. D. Lapoujade. Semiotext(E).

Deleuze G (1995) Postscript on control societies. In *Negotiations,* 177–182. New York: Columbia University Press.

Deleuze G (2001) *Difference and repetition*. Continuum.

Dubnov S, Surges G (2014) Delegating creativity: Use of musical algorithms in Machine listening and composition. In *Digital Da Vinci*, ed. Newton Lee, Springer.

Fisher E (2022) *Algorithms and subjectivity: The subversion of critical knowledge.* Routledge.

Galanter P (2012) Computational aesthetic evaluation: Past and future. In *Computers and creativity,* eds J. McCormack, M. d'Inverno, 255–293. Berlin, Heidelberg: Springer.

Gervás P (2001) An expert system for the composition of formal Spanish poetry. *Journal of Knowledge-Based Systems,* 14(3–4): 181–188 https://doi.org/10.1016/S0950-7051(01)00095-8

Goree S (2021) *What does it take to cross the aesthetic gap? The development of image aesthetic quality assessment in computer vision* [conference presentation]. Proceedings of the 12th International Conference on Computational Creativity. https://computationalcreativity.net/iccc21/wp-content/uploads/2021/09/ICCC_2021_paper_112.pdf

Longo A (2022). *Le jeu de l'induction : automatisation de la connaissance et réflexion philosophique*. Éditions Mimésis.

McCorduck P (1991) *Aaron's code: Meta-Art, artificial intelligence and the work of Harold Cohen*. W. H. Freeman & Co.

Pérez R (2017) *Mexica: 20 years-20 stori*es. Counterpath Press.

Romero J, Machado P, Carballal A, Correia J N (2012) Computing aesthetics with image judgement systems. In *Computers and creativity*, eds J. McCormack & M. d'Inverno, 295–322. Berlin, Heidelberg: Springer. https://doi.org/10.1007/978-3-642-31727-9_11

Ramsey F P (1931) *The foundations of mathematics and other logical essays*. London: Routledge and Kegan Paul. .

Savage L J (1954) *The foundation of statics*. Wiley. https://doi.org/10.1002/nav.3800010316

Savage L J (1967) Implications of personal probability for induction. *The Journal of Philosophy,* 64(19).

Veale T, Cardoso F A (2019) *Computational creativity: The philosophy and engineering of autonomously creative systems*. Springer.

Veale T (2012) *Exploding the creativity myth: The computational foundations of linguistic creativity*. Bloomsbury. https://doi.org/10.5040/9781472541659

AUTHENTIC EXPRESSION AND THE CYBORG RELATION: AN APPROACH TO ENGAGING WITH COMPUTER-GENERATIVE ART

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Abstract:
Obstructing our engagement with Computer-Generative art is an Authenticity Problem. This is where our engagement with Computer-Generative art is either seen through the prism of fantasy, such as romanticisation, or our engagement is defined by superficial inattentiveness. My aim is to show how a more fulfilling engagement is possible. This is my demonstration of the connection between Computer-Generative art and Authentic Expression. This is done by reorientating our focus away from artwork as primary and towards the artistic-process itself. I do this by conceptualising the CG-artistic-process as expressing a Cyborg Relation. My argument is that the Computer-Generative artistic-process, through the Cyborg Relation, authentically expresses our relationships with technology.

Key words: computer-generative art; authenticity; artistic-process; cyborgs .

Since our reality is shared, mediated, and challenged by machines of all kinds, it is not surprising that our computerised age will not leave the art-world untouched. However, the arrival of machines is not only as a tool that works under the direct control of the artist. Rather, technology arrives as a contributor and partner with its own capacities and independence, allowing it to add worth to the artistic-process. *Computer-Generative Art* (CG-Art) can be understood as a new artistic frontier. It is an artistic practice that forces us to question what we have always understood and accepted about how we create art. CG-art calls upon us to question our relationship with computers as well as our relationship to the creative acts that define our humanity. However, CG-art is a frontier that is not hypothetical. It is an empirical fact that CG-artworks exist and that they are most of the time aesthetically pleasing and sometimes even mesmerising. But can we say with confidence that we know how to engage with CG-art appropriately?

I am concerned with the question of how we can come to engage with CG-art in a way that can lead us to more nuanced and sophisticated evaluations. I do this by identifying what is obstructing this engagement—I believe CG-art is facing an Authenticity Problem. This Authenticity Problem comes to be because CG-art is perceived to be incapable of authentic expression. My aim is to address this problem and open our way to deeper engagement with CG-art by showing how CG-art can authentically express. I argue for how Authentic Expression is possible for CG-art by turning away from our usual focus on the artwork created and instead, turning towards the artistic-process itself. Through looking at the CG-artistic-process as a *Cyborg Relation* defined by *co-presence,* I aim to show how CG-art authentically expresses our relationship with technology.

Anything for a Computer-Generative Artistic Process

Defining Computer-Generative Art

Computer-Generative Art (CG-Art), like the rest of the Generative Art family, is process-orientated and is defined by the way the artworks were created instead of by the finished artwork that was produced (Galanter, 2016). As McCormack et al. (2014) note, the defining feature of CG-art is that the computer system that is brought into the artistic-process will have some degree of independence from the programmer herself . In terms of the computer's independence, McCormack et al. argue that the degree of this independence is relative to the artist/programmer. In general, the process of CG-art is distinct to other artistic processes that use computers because the programmer does not completely determine the computer's actions. This means that not only is the computer not used as a tool, instead, what we find is that the computer is actually deliberately designed so that it is capable of having a significant amount of artistic control itself (Boden & Edmonds, 2009). What is notable about this is that the computer and programmer are placed into a particular relationship with each other that is founded on the computer being treated as its own distinct entity that is capable of acting in an artistic process.

The second defining feature of CG-art is that CG-art is a result of generative rules, as Frieder Nake (2012) explains. It is vital to clarify that even though the computer is running by itself with no interference from the programmer, it is still rulebound. This is due to the fact that the programmer will code in artistic rules that govern the computer's behaviour (Nake, 2012). Nake states that these rules are ultimately ones of constraint rather than instructions that are derived from step-by-step algorithms that do not allow for any deviation from the specificity of the instruction. These rules of constraint will enable and limit the possible aesthetic decisions of the computer and so set the parameters of the scope of potential creations.

Within the boundaries of the parameters the rules set, the computer can still produce unpredictable results when it is left on its own (Boden & Edmonds, 2009). The computer can do this just by using the programmer's rules in interesting and inventive ways. What this shows is the extent of the computer's independence. Ultimately, the computer has the capacity to go beyond the expectation of the programmer. As McCormack et al. (2014) argue, as this possibility of unpredictability increases, the more complex the system and the more powerful the computer's processing capacities are. The significance of unpredictability is that it means the computer can be considered a contributor to the artistic process. This is because, through unpredictability, the computer gives to the process over and above what the programmer would have been able to do alone.

Nevertheless, just because the computer has the capacity to create unpredictably does not mean the rules are vague and coded without deliberate care. What is instead being asserted by Boden and Edmonds (2009) is that it is impossible for the programmer to know the system in its entirety. It is still impossible for the programmer to predict how a machine will interpret the rules and navigate the constraints that the rules bring. This implies that the rules are what bind the machine to the programmer and form the relationship that is the foundation of the Computer-Generative artistic-process. It is now crucial to see how the fundamental features of CG-art—the independence of the machine and the generative rules that the machine works with—are translated into the CG-artistic-process.

The Computer-Generative Artistic Process

Now that we have an idea of what CG-art is, we can begin to construct the CG-artistic process. We can say that the CG-artistic process is concerned with the incorporation of the computer into the artistic process as an artistic partner. This artistic process consists of three stages—*intention, creation,* and *evaluation*. These stages are the foundational stages of artistic creation and together can be seen as the core structural framework of all artistic processes. However, even before the computer can be incorporated into the artistic process, the programmer has to be the initiator of the process, which begins with her having something that she desires to be expressed. Contained within this desire is the knowledge that it can only be fulfilled through a CG-artistic process specifically (Boden & Edmonds, 2009). She then develops an intention that must be formulated with enough clarity to guide the construction of a conceptual space, which consists of interacting generative rules for the machine. In other words, the intention has to translate what the programmer wishes to express into computational form so that the computer can create (Nake, 2012).

Once the rules have been placed within a conceptual structure, the computer then acquires control over the artistic process to create an artwork. Because the rules leave open multiple possibilities for alternative combinations, restructurings, associations, and connections based on a variety of patterns, the computer can create an artwork that is unpredictable. The unpredictability of the computer lies with its capacity to interpret the interacting rules to such an extent that it would be unrealistic to try mapping them out (McCormack et al., 2014). However, the machine's complexity still does not include evaluative capacities at the same level of sophistication as human evaluation (Cohen et al., 2012). In order for the stage of evaluation to be fulfilled, the programmer has to take back control of the process and evaluate the machine's creation.

The construction of the CG-artistic process is founded on the recognition that the machine does have serious limitations when it comes to the creation of art. The machine, even with its advanced mechanisms, still cannot fulfil the entirety of an artistic process. This is because the machine can neither intend nor evaluate (O'Hear, 1995). The machine's extensive aesthetic skills must first be positioned appropriately by the programmer, as guided by her intention, in order for the process to be effective. One of the reasons is that the machine has nothing to express as it is completely unmoored from any personal or social context. Computers do not currently engage in our socio-cultural world with any awareness. So even though their presence is significant for us humans and they do shape our reality, computers have insufficient capacities to be aware of this significance and express it (O'Hear, 1995). This means that the machine can only create using the generative rules that are translations of the programmer's intention. In addition, this ensures the machine also cannot evaluate whether the artistic process has been successful or not, because the machine cannot make aesthetic judgements based on intentions it does not possess (Cohen et al., 2012). This then necessitates that the programmer will retain a substantial degree of artistic control and play a key role in the CG-artistic process.

However, this does not mean that the computer cannot become highly skilled at taking the programmer's intentions and transforming the expression beyond what the programmer could herself conceive. This is possible, as Hutchings et al. (2019) explain, due to the fact that CG-art computers are trained by programmers so that they can become more sophisticated creators. The training comes from the fact that the CG-artistic process moves through numerous cycles of the stages of intention, creation, and evaluation before the artwork has been determined as complete. These constant cycles within the artistic process ultimately train the computer, because with each cycle the computer will refine its use of the generative rules and so enhance how it performs its acts of creation (Colton, 2012). Nevertheless what this ensures is that there is always a return back to the programmer at some point. The reason is that the generative rules have to be constantly adjusted, augmented, and added in order for the computer to become more advanced when creating. This means that the programmer then is the one who decides when the CG-artistic process starts and ends for her intentions determine the generative rules the computer will create by and it is her evaluation which determines when the artwork is finished (Cohen et al., 2012). The training of the computer is the influence of the programmer's evaluations and subsequent adjustment of her intentions.

Much Ado About Authentic Expression

Defining Authenticity

Now that we know what CG-art is and the mechanisms of its artistic process, we must look towards our engagement with it. How do we engage with CG-art since it is now an empirically undeniable fact and will only develop further from here? My aim is to determine how we can come to engage with CG-art in a way that leads us to more nuanced and sophisticated evaluations. I believe that the clue that can help us to begin solving the puzzle is that deeper engagement becomes more likely if CG-art is perceived to be connected to the value of authenticity. Let us first start by defining what is meant by authenticity.

The first conception of authenticity that must be discussed is the most recognisable definition of authenticity. This is where authenticity requires that there be no deceptions, distortions, or falsity (Guignon, 2008). Authenticity is fundamentally connected to what is true. The second is that when we usually use the word authenticity, we use it to describe a particular entity, as if authenticity is inherent to something's nature. However, I want to argue conversely and define authenticity as an emergent characteristic. I believe we should understand authenticity in light of how it comes to be present and so should conceive of authenticity as coming from doing things in a particular kind of way (Guignon, 2008). It is only the appropriate process that can make us certain of whether authenticity is present or not in something. Therefore when we speak of something as being authentic, we are acknowledging the quality of authenticity only because authenticity emerged in the process that produced that thing.

So why is authenticity such a significant quality for art? William Bossart (1961) argues that the predominant reason for our need for art to be authentic is that we have a need for an artwork to be true. It seems quite evident that we have genuine emotions, thoughts, and other triggered associations when we respond to art. When we properly engage with art it has an impact on our inner landscape. Accordingly, it is obvious that we would want what we are engaging with to be neither a deception nor a manipulation of our responses by false expressions (Bossart, 1961). Consequently, because of the complex emotional and intellectual experience we have with art we want to engage with art that is truthful. Significantly, what this also implies according to Bossart, is that we wish to engage with art that expresses something meaningful (1961). This is because we wish for our emotions and intellect to not only respond to what is true but to respond to *something* that is expressed truthfully. In essence, we want to engage with art that authentically expresses some kind of meaning. What we are looking for when we wish to engage with art in a way that is over and above superficial interaction, is whether the artwork has achieved *Authentic Expression.*

The True Reality

In order to understand Authentic Expression and how it is connected to meaning, we must first look more closely at our conception of expression and what exactly must be expressed. To do this I need to introduce another concept, which I call the *true reality* of an artist.

The true reality is what the artist wishes to express in their artwork. It is what the artist wants to be expressed by specifically being translated into an artistic form. By using the word reality, I want to imply how infinitely broad the scope of possibility is in terms of what can count as a reality to be expressed. Even though authenticity, as Dutton (2005) argues, is traditionally tied to self-expression, we cannot limit the true reality to what is merely personal. The true reality is both about the nature of personal experience as well as the wider collective experience of a human world. The true reality also includes the influence of the artistic movements and developments of the time periods at present and in the past (Dutton, 2005). The artistic context is as important as the socio-cultural one. Therefore, we can grasp the true reality as the perspective of a person's social and individual context that is then deliberately brought within the folds of the artistic process. The true reality is when the artist has chosen to express something that is honest rather than a distorted expression of her "being in the world" (Baugh, 1988, p. 4).

The true reality has to be preserved in the artistic process in order for Authentic Expression to be achieved. Nevertheless, it is vital to note that there is no hierarchy of what counts as a better true reality. The true reality should be freed from the expectation of what counts as the right kind of meaningful content. The true reality's criterion is simply that the meaning to be expressed is a truthful one. Consequently, the true reality then is preserved in the artistic process for Authentic Expression to occur when it has been properly translated into an artistic intention, where the acts of creation align with this intention and then the work is evaluated to see if the true reality has in fact been expressed.

The true reality becomes connected to what is meaningful because the true reality is inextricably tied to the context the artist is in. It is the preservation of the truth of the true reality that is situated in the personal and collective world of the artist, within every stage of the artistic process. This allows something true to be communicated to the person engaging with the artwork, ensuring that Authentic Expression can be said to occur when an artwork can be certain to be communicating something meaningful (Bossart, 1961). What is important for Authentic Expression is that it is grounded in the idea that it is not necessarily the context of what is expressed that is true or false but the way it has been expressed. Authentic Expression then comes from the right kind of artistic-process that allows the preservation of true meaning from the stage of intention up until the end of the stage of evaluation when a work of art is deemed to be ready. Accordingly, since authenticity is an emergent characteristic not something inherent, we can further describe Authentic Expression as *emerging when an artwork expresses a true meaning because of how its artistic-process was enacted.*

As You Like It (But Not As It Is)

The Absent Narrative of the CG-Artistic Process

Let us return to CG-art. As we have already noted, it is an empirically undeniable fact that we have artistic productions of CG-art. These productions come from the process described earlier with computers defined both by their independence from their programmers and by the fact that they are programmed by generative rules. We see CG-art flooding our social media and smartphones such as with apps like Wombo.AI. We are also starting to see CG-art in our art museums like the Saatchi Gallery in London. Yet could we argue with confidence that we engage with CG-art with the full knowledge of what it is?

The source of where our engagement with CG-art breaks down is that very few people know exactly what CG-art is. The reason that we do not know what the nature of CG-art is, is because we do not know what its artistic process looks like (Hutchings et al., 2019). CG-art is fundamentally process-orientated, it is art defined by its practice. This means that if we do not know the CG-artistic process, CG-art becomes inaccessible to us (Galanter, 2016). The problem is that we usually do not engage with artistic processes when we engage with artworks solely created by humans. The implication of this is that we then misunderstand CG-art in that we believe that the computer is an autonomous creator because it is assumed that the computer would act like a human artist if it created something (Hutchings et al., 2019). Essentially, those who engage do not truly take into account the extensive role of the human programmer within the CG-artistic process and so the computer is seen as single-handedly generating these artworks for viewers' enjoyment. What is not acknowledged is that the computer is being trained extensively before the CG-artworks are brought to the public and that this is a major component of why computers perform so well as creators (Colton, 2012). CG-artworks are not simply delivered into a gallery or a screen but have gone through multiple permutations of the CG-artistic process with the programmer alone.

Essentially, when we engage with CG-art without a full recognition of the artistic process, the programmer is treated as invisible, when they should never be taken as so. A human is always behind the scenes even if the level of the programmer's artistic control is deliberately diminished. Viewers just do not see the artistic process and its numerous cycles and because of this are not encouraged to see the relevancy and importance of the artistic process of CG-art. This means that there is now an impoverishment of how CG-art is understood and so the real nature of CG-art becomes hidden. It is crucial to reiterate that CG-art is an artistic form that is process-orientated. If we do not acknowledge its process we essentially do not know what kind of art we are engaging with.

The Consequences of a Lack of Knowledge About the CG-artistic process

The consequence of not acknowledging the CG-artistic process is that this lack of knowledge of what CG-art is nurtures two kinds of troubling attitudes to CG-art. The first are attitudes that are fed by narratives based in fantasies of what the nature of CG-art happens to be; the second are attitudes of superficial inattentiveness, disinterestedness, and trivialising of the act of engagement. Here we can turn to Joanna Zylinska, who argues that:

> This recent outpouring of computer-made creative artefacts has been taking place against the unfolding of public interest in artificial intelligence, from fascination with its creative capabilities to the impending automation of the labour force or even the possible annihilation of the human species (Zylinska, 2020, p. 12).

Because of the lack of any knowledge about the CG-artistic process and the erasure of the extent of the contribution of the human programmer, there is now more room for the audience to project onto the computer anthropomorphic abilities (Pease et al., 2018). This is what romanticisation and fear-based fantasies share. In the romantic eye, the computer is an entity with greater capacities than it actually possesses. Furthermore, either the excitement of the current state of AI is over-exaggerated or there is the fear that AI is taking over a fundamental part of what it means to be human—the capacity to create art. The computer is entirely anthropomorphised while the human programmer is erased, leading to false ideas of what is being engaged with (Colton, 2012). At the core of these false ideas is a presumed familiarity with CG-art due to the absence of a representation of the CG-artistic process; representation of this process, however, would challenge these notions by showing how a different artistic-process is at play than the one that is worked through solely by a human (Colton, 2012).

Nevertheless, a majority of people that engage with CG-art merely engage with it on an extremely superficial level and see it not really as *art* but more as *visual entertainment*. CG-art, when taken as entertainment, can be placed within the context of consuming digital media at a rapid rate with no thought. It is a spectacle that is interacted with, with no consideration of what it is about or the implications that it brings. CG-art becomes like an Instagram filter—something to play with, get bored of, and move on from. The lacuna that results because of the absence of an acknowledgment of the CG-artistic process means that the novelty of CG-art is not associated with the intricacy and complexity of CG-art's nature and the process that created it (Zylinska, 2020). Instead, the novelty of CG-art is abused because of the computer's generative abilities to produce a multiplicity of artworks from the same conceptual space of generative rules; hence, CG-art's potential for novelty threatens to turn it into its own kind of clickbait (Zylinska, 2020). We can turn to Joanna Zylinska once more:

> Indeed, it is not too much of an exaggeration to suggest that, its playful aspect aside, much of current AI art, especially of the computer-and-data-based kind, ends up generating an odd combination of the fuzzy, the mindless and the bland (Zylinska, 2020, p. 72).

So if we do want to engage properly with CG-art, with all its potentials and falsities, it seems that we have quite a big issue here. How do we overcome our already entrenched patterns of engaging with CG-art? I think it begins with correctly identifying what the problem is—CG-art is facing an *Authenticity Problem.*

The Authenticity Problem

So now it is time to place our identified patterns of engagement with CG-art in relation to the value of Authentic Expression. As we stated before, largely due to the fact that the CG-artistic process is inaccessible, CG-art is treated as mere entertainment or it is excessively romanticised or feared. The common thread between them is that these forms of engagement show us that CG-art has an *Authenticity Problem.* This problem is constructed based on the foundation that what unites these different perspectives of CG-art is that CG-art is treated as being incapable of Authentic Expression and so is not worth proper and respectful engagement. In the case of seeing CG-art as trivial entertainment, CG-art is not worth any investment in engaging with it because it is seen as simply "pseudo-art." Here CG-art is treated as if it has no potential to express anything, let alone authentically express. On the other hand, when CG-art is seen through a prism of fantasy there is no interrogation of whether the assumptions that are built into these fantasies are true instead of false distortions. Because of this, there is no effort to engage with CG-art as it is. This means that CG-art is also treated as if it has no potential to authentically express anything because it is not treated as worth engaging with its true nature.

I want to focus on CG-art as entertainment and spectacle. In order to fully understand why CG-art is believed to be mere entertainment, it is necessary to remember that falsity is not only a deception or a distortion, it can also occur when people believe there is no inherent meaning in what they are engaging with (Bossart, 1961). There is a sense of falsity because CG-art is seen as devoid of the significance we expect from art generally—that art expresses something to us as the audience. The questioning of whether CG-art can express anything is fundamentally connected to the fact that the programmer has been written out of the narrative while simultaneously there exists unchallenged scepticism toward the notion that the computer could ever express anything (Galanter, 2016). CG-art then is taken as "fake-art" because there is nothing in the computer that has the capacity to express meaning, since it neither has the awareness of the context needed for expression nor the awareness to respond to this context. This scepticism is exacerbated by how the computer seems to produce without purpose when it constantly produces more and more artworks (Galanter, 2016). Unpredictability is then not a sign of the computer's independence; instead, it is a sign of the computer's purposelessness. CG-art is then "fake art" as it mimics human art but without any deliberate creative action.

Confining CG-art to the abstract arts like abstract-expressionist painting does not solve the issue, for there must be the recognition that we have implicit expectations that art expresses meaning even if it is a highly abstracted meaning. For instance, because we are intellectually challenged by an Yves Klein painting, we perceive it to be meaningful. However, when a computer produces a pastiche collage, there is a tendency to doubt that it contains meaning to respond to. Without the human programmer, the aspect of intention is lost, and it is this aspect that anchors meaningful expression in artworks. Hence, CG-art becomes trapped in the ever-evolving cycle of mere entertainment.

We find ourselves in a situation of distrust, fearful of engaging with a manipulated, false, or distorted artwork because of the emotional and intellectual costs of doing so. Beyond the question of whether this investment in determining the artworks' meaning is worthwhile, we are faced with the more fundamental question of whether the art is even worthy of any attention beyond superficial enjoyment of the spectacle. What this tells us is that CG-art not only inspires distrust on the grounds that it is false and manipulative "pseudo-art" with no Authentic Expression; in addition, CG-art faces scrutiny insofar as it is seen as fun but superficial entertainment that is not worth a genuine investment of attention and time. The issue inherent in this perspective is that if CG-art is automatically assumed to have no capacity for Authentic Expression, then the questions of whether it is false or not and whether it is worthy of our trust are resolved without debate. Because CG-art is assumed to automatically have no Authentic Expression, and is therefore considered unworthy of respectful and appropriate engagement, the philosophical questions that it raises are largely neglected.

Two Entities of the Cyborg Relation

Introducing the Cyborg Relation

There are two ways I believe we can address the Authenticity Problem for CG-art. The first way is to assess whether true meaning can be preserved in the CG-artistic process. This is where we turn to the definition of authenticity, where authenticity is an emergent characteristic that arises out of the right kind of actions. This means that the stages of intention, creation, and evaluation are each their own determining factor as to whether authenticity will emerge. Consequently, we will have to see if each stage is able to preserve the meaning of the true reality in turn. This approach indicates the CG-artwork has the quality of Authentic Expression because of the right kind of CG-artistic process. However, someone could contest this approach on the grounds that the unpredictability of the computer's creations makes it too difficult a task to assess whether every CG-artwork possesses Authentic Expression. Assessing Authentic Expression would become too demanding.

There is another possibility for how CG-art can authentically express something. However, what is required is a rethinking of how we approach art and the artistic process. In most cases when we engage with works of art we engage with the artwork, and how the artwork came to be is considered a secondary phenomenon. We also know that this has led to numerous theories of how to engage with art, such as Roland Barthes' *Death of the Author*, which privileges the artwork over the process (as cited in Pease et al., 2018). But what if the process itself expresses something that is worth engaging with? What if the artistic process expresses something over and above the artwork it produces? Instead of seeing the CG-artwork as the place where Authentic Expression becomes realised because of the CG-artistic process, we should rather reorient ourselves to see the CG-artistic process as its own source of Authentic Expression (Galanter, 2016). Essentially, what I want to argue is that *what CG-art authentically expresses is the true reality of its own artistic process*. This is what I call the *Cyborg Relation*.

The Cyborg Relation is the relationship that develops between the programmer and the computer when enacting the CG-artistic process. The Cyborg Relation is concerned with the creative potentials of the machine and the programmer and how they influence and form each other (Hodder, 2012).

Under consideration is the Authenticity Problem, meaning the perceptions of CG-art that arise when it is seen through the prism of fantasy– thereby inflating the machine's capacities–or seen through the prism of doubt–in which case the machine's capacities are not recognised at all. To address this issue, we contend that the CG-artistic process is best understood as being built on the foundation of a Cyborg Relation.

The Cyborg Relation eschews the binaristic trap that maintains that machines must create like humans, and so create completely autonomously, in order to be expressive. The Cyborg Relation addresses assumptions of the machine's creative capabilities by showing both the machine's capacities and limitations, while also bringing the programmer back into the narrative. I want to argue that the demands of the CG-artistic process, irrespective of whether a true reality has been preserved in the process, forces a particular relationship with the programmer and the machine to develop. It is when we begin to recognise this partnership between machine and programmer that we can then grasp the nature of the dynamic between their respective roles and how their roles interrelate with each other (Hodder, 2012). The Cyborg Relation names the partnership that involves a distinct interweaving of human's expressive capacities and ability to intend and evaluate and the machine's capacities to transform generative rules into a plethora of creative possibilities. Therefore, when thinking about the cyborg in terms of the Cyborg Relation, we must not understand it as the merging of human and machine into a singular entity. In contrast, I define *the Cyborg Relation as being an intertwining of machine and human participation within a unified artistic process*.

Peter-Paul Verbeek defines a cyborg as a "border-blurring entity" that comes to unite both the human and the non-human. For me, the Cyborg Relation is only "border-blurring" in a particular way (2008). The CG-artistic process breaks down the borders of machine and programmer just enough to have a strong partnership form, although not to the extent that the machine and the programmer cannot retain their distinctiveness. Where Verbeek is particularly helpful is his reminder that we naturally take humans as actors and machines as passive (2008). This is important to keep in mind when writing the programmer back into the narrative. When we reassert the human programmer as being a fundamental part of the CG-artistic process, we must be careful not to paint a picture of the programmer as possessing complete artistic control. This is because we do not want to risk reverting back to the binary where artistic control can only be held by the machine or the programmer but not both. We do not want the presence of the programmer to automatically exclude any possibility of the machine being seen as sophisticated enough to enter into an artistic partnership with their programmer, rather than being a tool. What the Cyborg Relation allows room for is that a machine can be taken as active not passive, while still being recognised as not having the same capacities as humans. The fact that machines have limitations means that if a machine is to fulfil what capacities for creation it does possess, it has to enter into a partnership with a programmer so that a human can perform the roles in the artistic process that the machine cannot complete itself.

The Cyborg Relation as Co-Presence

Before we can understand how the Cyborg Relation is the Authentic Expression of CG-art, we must grasp more intimately the nature of what the Cyborg Relation is. As we know, the CG-artistic process is not traditionally cyborg since both machine and programmer are separate entities that have their own distinctive roles. Therefore, how I conceive of the Cyborg Relation is that it is the process itself which is cyborg. The unified artistic process is the intertwining of machine and human capacities in a series of actions for one outcome—the creation of an artwork. My conception of the cyborg then, is not a new entity that consists of both machine and programmer but rather a specific relationship that forms in the space between the machine and the programmer. The Cyborg Relation then can be understood in terms of a relationship defined as, what Paul Piris calls *co-presence* (2014).

So what is co-presence? Co-presence can be described where two entities are inextricably bound though remain distinct. Co-presence is where two entities are defined by how they relate to each other without merging into each other to become some new thing. Rather, these two entities assert their own identities while still being intertwined in a shared space (Piris, 2014). It is in this way that the machine and the computer are in a Cyborg Relation. They share the same space of the artistic process they are part of by contributing their own particular capacities, in this case, the computational flexibility of the computer and the expressive and evaluative abilities of the human programmer. Crucially, the machine and programmer must remain their own entities both because this is a fundamental criterion of CG-art—that the computer creates independently for some part of the artistic-process—and because it allows for more room for the developing of the computer's and programmer's creative capacities. For instance, if the computer is used as a tool, the direct artistic control of the programmer would inhibit the wide scope of potential expressive possibilities that the computational capacities of the computer can bring to the CG-artistic process.

To understand the significance of the cyborg relation as a relationship of co-presence, it is important to explore the relation between the programmer's expressive capacities and the computer's computational capacities. Co-presence involves the programmer and the computer creating the shared space of the CG-artistic process by enacting their own distinctive roles, which come to influence the formation of the other (Colton, 2012). In this sense the shared space is constituted through distinctive roles that are never purely formed but rather are perpetually adjusted, rethought, and reconfigured based on the other's actions. So the space of the CG-artistic process becomes constructed from the webs of relations between the machine and the programmer.

For instance, if the programmer has a true reality and wishes to express it through engaging with the CG-artistic process, she then must be aware of the computer's capacity when formulating her intention (Cohen, 1974). If she is unaware of both the limitations and the capabilities of her computer, when the computer has artistic control, it would be unable to follow through with her intention when it creates. Co-presence would not be possible because the computer would then fail to take its own space in the process. This would then sever the relation between the computer and the programmer and so would not express the Cyborg Relation. For instance, if the programmer does not take into account the unpredictability that comes with the machine's computational abilities, there is a greater chance of the computer failing to create in a way that is aligned with the programmer's intention. Therefore, the programmer must be aware of what level of constraints are put in place by the generative rules that will be needed for the computer to be incorporated into a unified artistic process (Colton, 2012).

What this means is that not only does the programmer have to hold her own in the space of the process, she also needs to be aware of what the computer needs from her to be able to hold its own space within the process and so enter into a partnership with her. This can only come with the programmer translating her expression effectively into an intention that can form the matrix of generative rules for the computer. She has to know intimately the nature of the computer that she will enter into partnership with and have enough artistic skill to translate what she wants to express into a form that is compatible with the computer's mechanisms. The nature of the computer is ever-present in the programmer's expressive decision-making.

Co-presence within the cyborg relation is then formed when there is respect for the computer as its own entity with its own capacities. The cyborg relation is formed on the foundation that a machine's independence is necessary for the CG-artistic process while still allowing for the machine to be dependent on the programmer for the rules it needs to create. At the same time the cyborg relation does not overshadow the fact that the programmer is dependent on the computer or her desire to complete a CG-artistic process will be unfulfilled. Therefore, the programmer's and computer's independence is not mutually exclusive to their dependency on each other, since each of their capacities inform how the other will perform their role in the process (Hodder, 2012). What we find in the Cyborg Relation is a partnership that naturally has the push-pull of independence and dependence that effectively enables the enhancement and exploration of creative capacities.

Authentic Expression and the Cyborg Relation

So why is the cyborg relation and its demonstration of co-presence in the CG-artistic process a kind of Authentic Expression? Let us return to the two kinds of attitude that we saw as consequences of the absence of any knowledge of the CG-artistic process when engaging with CG-art. The first kind of attitude is comprised of perspectives that see CG-art through prisms of fantasy—either excessive romanticisation or excessive fear-based reactions. These perspectives over-exaggerate the capacities of the computer and project anthropomorphic abilities onto the machine. The second kind of attitudes are superficial forms of engagement and disinterestedness that come with perceiving CG-art as merely entertainment and spectacle. Both attitudes treat CG-art as not worth properly engaging with by treating CG-art as being incapable of Authentic Expression—firstly by not being willing to respectfully engage with CG-art *as it is* or not seeing CG-art as being able to express meaning that can have intellectual and emotional impact. I believe the Cyborg Relation challenges these attitudes by reorienting us away from what the CG-artwork expresses towards showing us how the CG-artistic process itself authentically expresses the true reality of our relationship with technology.

Co-presence within the cyborg relation shows us that the computer does not have to either be a tool for the programmer's expression or to be completely autonomous and express for itself. This means that the cyborg relation authentically expresses how binaristic understandings of our relations to technology–and especially AI–do not tell the whole story. What is being authentically expressed is the significance of how we build our relationships with computers. The CG-artistic process itself becomes its own kind of true reality. This is because the Cyborg Relation shows us how we can become entangled with machines, computers, and programs. By acknowledging both the machine's capacities and limitations, the Cyborg Relation authentically expresses our present day true reality—that we are responsive to the fact that machines are both advanced and powerful while still being restricted in their abilities (Hodder, 2012). The Cyborg Relation shows us that what is important is not what the machine can do but what the machine can do with us.

The Cyborg Relation is the acknowledgement that the capacities and limitations that form the nature of a computer will ultimately impact us and determine our actions. For instance, by having the desire for a machine to fulfil our intention, we incorporate into our intention the means for which the machine will be integral to our actions. When we act with a machine, we naturally have to think of what the nature of the machine is and adapt our intention to the particularity of the machine in question. If we did not enter into partnerships with machines by understanding their nature and aligning our desires and expressive capacities with them, machines would not occupy meaningful space in the world because their purpose would be unfulfilled. The Cyborg Relation then authentically expresses our shared experiences of having our everyday life mediated by machines and how machines need us to realise the purpose of their nature (Hodder, 2012). Chiefly, by not inflating machine capacities or underestimating them, the Cyborg Relation accurately shows how machines and humans are still in a state of interdependency and that the true reality of machine/human relations is the ordinariness of a shared space of action. This Authentic Expression then allows us to reflect on what it means to be in partnership with technology. Only seeing CG-art as entertainment shows how disengaged and unreflective we can be about our relationships with the technology we are in contact with.

The Cyborg Relation can also authentically express why we would want to enter into these kinds of relationships with computers. We can ask ourselves, why would the programmer want to express anything through a CG-artwork? The Cyborg Relation shows us how human expression can be extended beyond the present limits of how the programmer conceives of all the potential ways she could express something (Cohen, 1982). It is inevitable that all artists will be limited with regards to the possible avenues of expression that are immediately perceptible to them. This does not exclude the programmer. Because the computer has such intricate mechanisms and a capacity for creating unpredictably, the computer is able to take what the programmer intends to express and open up new avenues of expression with it. Furthermore, because the intention of the programmer is translated into generative rules, the variety of possibilities, mutations, reconfigurations, and alternative manifestations is endless. Subsequently, the programmer can see her own expression from multiple vantage points. For the CG-artist Ernest Edmonds (2018), what is significant about this new perspective is how it gave him a greater awareness of his own artworks, his artistic process, and the nature of visual art as a medium.

The Cyborg Relation authentically expresses the possibility of experiencing our own expressive capacities from a point of view we would not have access to without the computer. What the Cyborg Relation then authentically expresses is that we find it meaningful to enter into these relations with machines. When we enter into relations with machines we give ourselves access to new spaces to be, to express, and to experience. The Cyborg Relation then authentically expresses how it is the relationship that results from our entanglement with technology that can lead us to potentially new productive spaces of human thought. What is authentically expressed in the Cyborg Relation is our human curiosity about machines. CG-art may be at the stage where it is seen mostly as superficial entertainment; however, this cannot overshadow the fact that how CG-art is created tells us a much deeper story.

When we return the programmer to the narrative of CG-art and create a new appreciation of CG-art as cyborg art, we can then see CG-art as a practice that authentically expresses our means of interacting with the world and why we would want to interact with the world in that way in the first place. We have the opportunity to reflect on our relationship to technology because the Cyborg Relation authentically expresses not just great technological advancements in creativity but also the ordinariness of our technological age. What is more, CG-art and its Cyborg Relation also authentically expresses how incredible the sheer power of human invention is. We must always remind ourselves who creates these machine creative partners and who lets their expression move beyond their human hands to become inherently cyborg. This is the radical artistic action of the programmer, which authentically expresses the radical actions of our own technological reality.

References

Baugh B (1988) Authenticity Revisited. *The Journal of Aesthetics and Art Criticism*, 46(4): 477–487.

Boden M, Edmonds E (2009) What is Generative Art? *Digital Creativity*, 20(1–2): 21–46.

Bossart W (1961) Authenticity and Aesthetic Value in the Visual Arts. *British Journal of Aesthetics*, 1(3): 144–149.

Cohen et al. (2012) Evaluation in Creative Aesthetics. In *Computers and Creativity*, eds J. McCormack, M. d'Inverno, 95–111. Berlin, Heidelberg: Springer.

Cohen H (1974) On Purpose: An Enquiry Into the Possible Roles of the Computer in Art. *Art Studio International*, 197(962): 11–16.

Cohen H (1982) *How to Make a Drawing*. National Bureau of Standards.

Colton S (2012) The Painting Fool: Stories from Building an Automated Painter. In *Computers and Creativity*, eds J. McCormack, M. d'Inverno, 3–38. Berlin, Heidelberg: Springer.

Dutton, D. (2005). Authenticity in Art. In J. Levinson (Ed.), *The Oxford Handbook of Aesthetics* (pp. 143–158). Oxford University Press.

Edmonds E (2018) Structure in Art Practice. In *Explorations in Art and Technology* (Springer Series on Cultural Computing), eds L. Candy, E. Edmonds, F. Poltronieri, 2nd ed. London: Springer Verlag.

Galante P (2016) Generative Art Theory. In *A Companion to Digital Art*, ed. C. Paul, 1st ed., 146–180. John Wiley & Sons, Inc.

Guignon C (2008) On Authenticity. *Philosophy Compass*, 3(2): 277–290.

Hodder I (2012) *Entangled: An Archaeology of the Relationships between Humans and Things*. John Wiley & Sons, Inc.

Hutchings P et al. (2019) Autonomy, Authenticity, Authorship and Intention in Computer-Generated Art. *Springer Nature Switzerland AG* 2019: 35–50.

McCormack J et al. (2014) Ten Questions Concerning Generative Computer Art. *LEONARDO*, 47(2): 135–141.

Nake F (2012) Construction and Intuition: Creativity in Early Computer Art. In *Computers and Creativity*, eds J. McCormack, M. d'Inverno, 61–94. Berlin, Heidelberg: Springer.

O'Hear A (1995) Art and Technology: An Old Tension. In *Philosophy and Technology*, ed. R. Fellows, 143–158. Cambridge: Cambridge University Press.

Pease A et al. (2018). Issues of Authenticity in Autonomously Creative Systems. Proceedings of the Ninth International Conference on Computational Creativity, ICCC, eds F. Pachet, A. Jordanous, C. Leon, 272–279.

Piris P (2014) The Co-Presence and Ontological Ambiguity of the Puppet. In *The Routledge Companion to Puppetry and Material Performance*, eds J. Bell, C. Orenstein, D. N. Posner, 30–41. Routledge.

Verbeek P-P (2008) Cyborg intentionality: Rethinking the phenomenology of human–technology relations. *Phenomenology Cognitive Science*, 7: 387–395.

Zylinska J (2020) *AI Art: Machine Visions and Warped Dreams*. Open Humanities Press.

THE INTERRELATION BETWEEN PHILOSOPHY FOR CHILDREN (P4C) AND CREATIVE THINKING

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Abstract:
The aim of teaching philosophy to children ultimately is not to teach them the history of philosophy, but rather to teach them to think, starting from philosophical concepts. This will help to develop high-level skills in children such as questioning, research, understanding and interpreting knowledge, establishing meaningful relationships between knowledge, creating original ideas, and problem-solving. Models of philosophizing with children have been developed, and systematic application attempts have been made, producing successful results in many countries of the world. According to Matthew Lipman, these skills should be developed at a very young age with use of the model of philosophy for children (P4C). Our aim is to show and explore how to develop and sustain creative thinking, which is one of the achievements of P4C. If Lipman is right, children participating in these activities will start to gain creative thinking skills from an early age and will apply this foundation in other knowledge acquisition processes at more advanced developmental stages. This presentation aims to reveal the interrelation between P4C and creative thinking activity. First P4C will be explained, and then creative thinking and the interrelation between the two will be expanded upon in the conclusion.

Key words: The philosophy for children (P4C), thinking, creative thinking, education.

1. What is P4C?

Philosophy for children (P4C) is a thinking education program put forward by the American philosopher Matthew Lipman (1923–2010) in the 1970s. His approach has rapidly gained importance in recent years. It is aimed at developing the thinking skills of children through philosophical dialogue. The discussion of best practices in education is critical, and increasingly today studies suggest that philosophy is important for children. Matthew Lipman suggested that philosophical education should be introduced in childhood, based on the limited intellectual abilities of his students at the university level. In our education system, children begin receiving instruction in philosophy at around 16 or 17 years of age. This strategy prevents philosophical education from fully achieving its purpose. According to many thinkers, especially Lipman, children should encounter philosophy at an early age in order to gain philosophical thinking skills. Early childhood philosophical education should aim at developing the critical and creative thinking skills of children and encourage them to make use of philosophical thinking when questioning and wondering, especially since many people lose their curiosity and stop asking questions after childhood. Socrates said many years ago to his students: ‘Tell your own thoughts, not what you have read and heard.’ He knew the importance of critical and creative thinking. In fact, we would like to argue that philosophy for children, whose foundations were laid with the Socratic method, Cartesian doubt, and phenomenology, is necessary for developing thinking skills in many areas in addition to creative thinking.

When we look at the history of philosophy, the essence of philosophy is the feeling of curiosity and the desire to understand the world in which we live. A person feels curious and asks various questions while trying to understand something. . A philosopher, then, is someone who concerns himself with questions, including those that others have stopped asking. Features such as the desire to explore the world and the desire to understand, ask questions, and wonder are also qualities that exist in children.

Children, just like philosophers, are courageous: they wonder about the world they live in, explore their surroundings, and try to understand the world by asking various questions. Thomas Wartenberg explains that children born with natural curiosity are natural philosophers (thus, the chapter title of "Natural-Born Philosophers") in the first part of his book, *Big Ideas for Little Kids*. For this reason, Wartenberg argues that children can naturally philosophize, based on the questions his own child has asked him. Given this view, Wartenberg believes the creative perspective of children who are natural philosophers should be supported, which is made possible by providing children with an education in philosophy starting at an early age. This allows children to learn to express their ideas openly, support them with valid reasons, and discuss their views with others, and is facilitated by use of the P4C model (Wartenberg, 2009; Öğüt, 2019).

In her (2016) book, *The Little Prince*, Nuran Direk, who teaches philosophy to children, suggests that children begin asking questions that elicit philosophical thinking at an early age. According to her, philosophical education is based on questioning, and it is important to approach philosophy with a broad imagination, which children develop at a young age (Direk, 2016; Öğüt, 2019). Therefore, it is necessary to introduce this education in childhood.

For this reason, Lipman developed the "Philosophy for Children," P4C, program and resources. This program is based on Socratic dialogue (called 'Socrates' questioning'), which includes asking questions or telling stories. Questioning, which encompasses the ability to express an argument, to wonder about things that are often ignored, to be receptive to new information, to be open to the opinions of others, and to work collaboratively, is strongly linked to critical thinking (Ventista, 2019). By prioritizing 'Socrates' questioning,' Lipman believes the P4C program encourages children to think critically and creatively (Vansieleghem & Kennedy, 2011; Ventista, 2019; Lipman, 1976; Karakaya, 2006; Gasparatou & Kampeza, 2012). To these P4C activities, we encourage educators to add the methods of Cartesian doubt and phenomenological reduction, because children start to think critically and creatively by doubting and considering new perspectives on what they have learned, a process that helps them to think of new ideas and solutions. In addition to philosophical instruction, P4C involves the participation of students in a philosophical "Inquiry Society," which allows students to learn from their peers

1.1. Content of Philosophy for Children

Philosophy for children introduces a form of questioning that moves from the specific to the general, allowing students to learn how to engage in discussions with greater conceptual depth. The selection of texts such as children's novels, short stories, poems, newspaper articles, and essays that are used is important since they represent the basis of conceptual discussions in which children learn philosophical thinking skills. For this reason, the texts that are chosen should have some basic features identified by Lipman and Sharp as follows. The texts should be relevant to the daily life of the children, should be age-appropriate, and should not contain abstractions that children cannot understand. In addition, philosophical concepts, such as happiness and friendship, which are in children's lives and are easier to understand than more complex concepts, should be incorporated in the text. The characters in the texts should also be a model for children during questioning; these characters should be ordinary or everyday people to whom children can relate (Çayır, 2015).

1.2. The Contribution of Philosophy for Children to Children

According to Lipman, P4C is an important component of early childhood education because it establishes a foundation for the most important cognitive skills that children will continue to develop throughout their education. Lipman notes the importance of introducing material that will hold children's attention, rather than necessarily prioritizing the kind of material that is considered essential or canonical at universities. According to him, philosophy for children is an educational approach used to develop children's thinking capacities–especially those that are critical, creative, collaborative, and caring (Lipman, 1976).

Philosophy is for children–only, they play with thoughts, words, and objects, not with a bike or a ball. Children do not give up their games and adventures when they interact with philosophy; instead,they get the chance to apply new thoughts in these games and adventures and to ask creative and playful questions. The world of children is the world of play and entertainment, and our duty as adults is not to separate them from this world, but to try to include them in the game of philosophy (Gaedi, 2015).

Philosophy has clear cognitive goals for children. Philosophy forces the mind to work. This is done through challenges, basic thinking, and structural interaction. The philosophy education program for children also has the social purpose of teaching democratic decision-making. This program can lead to continued participation and the development of the individual's consciousness. Teaching the thinking methods of philosophy can be considered the most general and obvious goal of this program; however, from Lipman's point of view, the most important goal of this program is to help children learn how to think, especially in ways that are critical, creative, collaborative, and caring (Gaedi, 2015).

1.3. Why is philosophy important for children?

So, what materials should be used in philosophy education with children so that children become individuals who think, question, and discuss? Lipman (2003) and Wartenberg (2009) mention the importance of using stories in philosophy education with children. According to them, stories provide excellent material for fostering a productive discussion environment for children. Stories give children the opportunity to discuss philosophical questions/concepts among themselves. To make the most of these resources, Lipman recommends that P4C instructors guide students in examining any pictures related to the story and discussing the title of the story. . While reading the story, the relevant philosophical concept(s) should be determined, and the events in the story should be discussed in terms of questions that pertain to the determined philosophical concept(s). After reading the story, students should continue to ask questions and discuss philosophical concepts in light of the whole story (Çayır, 2015 cited in Özkan, 2020)

P4C offers children a chance to make the world more meaningful and discover what they will find valuable within it. It contributes to children's creative and critical thinking skills,benefits of philosophy that are realized through the active participation of children in philosophical inquiry. In addition, philosophy includes the study of ethics. Children are exposed to ideas and images about ethical issues through television, the internet, and other media. Philosophy for children aims to help children develop their capacities by correcting their thoughts, feelings, and behavioral habits through ethical inquiry, rather than simply deferring to the rules and values dictated to them. Therefore, P4C helps develop empathy and prosocial behavior, which is the fundamental goal of values-based education.

The methods of P4C contribute greatly to children's cognitive abilities: not copying the ideas of others, producing their own ideas, questioning ideas, defending ideas, being tolerant of new ideas, developing creative and critical thinking skills, emotional development, general creativity, and deepening their relationships with peers and adults. According to Lipman, children are taught creative and critical thinking through philosophy. In order for children to learn to think philosophically, they should be introduced to philosophy at an early age when they are curious and have a wide imagination and a questioning nature.

2. Creative Thinking

Francis Bacon announced that “knowledge is power” in 1620. Producing knowledge and science requires new, different, and creative thinking. Therefore, as Bacon says, knowing nature makes it necessary to produce knowledge in order to control it with the power of knowledge. To that end, scientific research provides important evidence of how our skills can be improved today. Among the skills that can be developed is creativity. Likewise, while the scientific community has accepted that the production of knowledge increases our power, there is an understanding that this process of production can only be maximally fruitful if it is innovative. Addressing the concept of creativity and its importance is therefore the first step toward individual achievements and social development.

Creativity is an active process necessarily involved in innovation. It is a learned habit that requires skill as well as specific understanding of the contexts in which creativity is being applied. The creative process is at the heart of innovation, and often the words are used interchangeably.

According to the historical sources available, creativity was included in education in the time of the Ancient Greeks, but was considered a natural skill most closely related to the concept of genius (Cropley, 1995). This perspective emphasizes the importance of producing a concrete product through application of the creative process and attributes creativity mainly to gifted people (Ünlüer, 2014). Creativity is an important skill that broadens perspectives, offers new understandings, and gives individuals and society the opportunity to forge new paths. Considered purely as an abstract and complex concept, creativity generates manifold competing opinions and ideas in many sources (Goncalo, 2009; Boden, 2004). Within such sources, creativity also goes by many names, including: innovation, productivity, contradictory (different) thinking, originality in various application areas, etc. (Bateson & Martin, 2014).

There are many different definitions of creativity. According to Englebright Fox and Schirrmacher (2014), some accepted definitions are as follows:

– The ability to look from different perspectives,

– Being able to go beyond the information given and its boundaries,

– Thinking outside of traditional ways,

– Do something original,

– Putting things that seem unrelated to each other together to create something new.

Sternberg and Lubart (1999) define creativity as the ability to produce and apply brand new and useful work in an original and unexpected way. Creativity at the individual level may entail solving problems in an individual's professional and daily life; creativity at the social level may lead to the emergence of new scientific discoveries, new artistic movements, new inventions, and new social programs.

Torrance (1968), one of the most important names in creativity studies, saw creativity as action and formulated a definition that captured this. According to him, creative action can be artistic as well as mechanical and theoretical. For Torrance, creativity is “sensitivity to problems, disorders, lack of information, missing items, incompatibility, defining difficulty, seeking solutions, making predictions or developing hypotheses about deficiencies, changing or re-testing experiments, and then revealing the result.”

Reativity is the finding of a unique solution to a problem that needs to be solved through various stages (Dirim, 2001), and the creation of new and suitable ideas or products that achieve a goal. Creativity according to MacKinnon is "a process that has spread over time and has the features of innovation, adaptability and realization" (Gander & Gardiner, 2001).

As a result, we can explain creativity as a way of seeing from different angles a world where there is no right or wrong answer, only possibilities. In creative thinking, it is important not to be afraid of making mistakes and being ridiculed, but to be prepared to take risks and have fun with silly ideas.

2.1. Dimensions of Creativity

Today, it is accepted that creativity is a skill for everyone. It is thought that creative activities are pursued or inhibited only according to the perspective of individuals and societies in regard to the kinds of creativity that have value. However, it is important to note that personality traits also play an important role in creativity, which is itself an innate skill in human beings. In creative people, it is possible to observe traits that indicate a nature that is curious, investigating, questioning, capable of seeing from a broad perspective, built upon a solid information infrastructure, not afraid of taking risks. According to San, creative people are defined by many qualities, which include: curiosity, ambition, pride, independence, a sense of responsibility, leadership abilities, and the power to persuade. Additional qualities are: self-reliance, risk-taking, high energy and passion for adventure, persistence, opposition to traditional restrictions and prohibitions, seeing life as a constantly exciting and meaningful experience, having a playful and cheerful nature, prefering to be on one’s own, being willing and idealistic. An inclination to participate actively and visibly in the foreground (rather than hidden away in the background) is another notable feature (Sünbül, 2002).

In addition, Torrance has listed a number of features that can be essential for creativity, which are related to those previously discussed. These features are:

1 – Curiosity, 2 – Flexibility, 3 – Sensitivity to problems, 4 – Redefinition, 5 – Self-feeling, 6 – Originality, 7 – Insight (cited in Zeteroğlu, 2011).

2.2. Components of Creativity

Today, it is accepted that everyone has creative potential (Runco, 2003). From this point of view, it can be said that creativity is a process that happens every day and in ordinary situations (Richards, 2006). On the other hand, it is possible to further develop creative potential. Creative activity has an important effect, especially on the development of baseline creative potential. Creative processes encourage cognitive freedom and the discovery of (new or existing) ideas, exercising and fostering one's overall creative ability. There are two main steps to support creative potential in children and young people. These are:

1 – Exploring various materials, objects, and ideas through games and collecting and using what they have discovered,

2 – Using these discoveries to make new connections (Duffy, 1998).

In studies on creativity, it is seen that creative thinking develops conjointly with increasing cognitive fluency, originality, flexibility, and overall ability. However, it is also accepted that individual creativity can be affected by various variables related to emotion, social situation, cognition, and motivation (Chien & Hui, 2010).

2.3. Factors Affecting Creativity

There are several factors that affect creativity. These can be subsumed under certain headings, such as heredity, family, education, society, personal characteristics (temperament), and culture.

In the field of genetics, which is an important research subject today, studies indicate that the abilities of human beings are influenced by genetic factors; however, the relationships between genetics, society, and individual ability remain mysterious. The genetic structure of human beings is formed by the chromosomes of the mother and father, but determining the natural creative potential of individual human beings and ascertaining to what degree this creative potential is heritable remain challenging.

Around the world, people are born into hundreds of different and unique cultures; however, that the first environment in which human beings open their eyes to the world is that of the family is something they have in common. When the childhood lives of individuals who become famous by doing important works and who are considered to be creative geniuses are examined, the influence of the family is revealed. The positive or negative effects of communication within the family on children's creativity are very strong. The influence of the family and its social and economic circumstances is very important in child development, affecting a child's ability to express oneself in the family, act spontaneously, and satisfy the need for safety, love, and affection. These factors also affect the creativity of the child in connection with his development.

Nother main factor that affects creativity in children is education. The most basic task of education is to shape the individual on behalf of society and to ensure harmony between the individual and society. It is important for children to feel free to express themselves creatively. Many studies suggest that creativity atrophies at school; however,it has also been observed that the level of creativity increases to a certain point as the education level increases. Since promoting creative thinking is among the important functions of education, education should prioritize opportunities to include practices that support children's creativity skills and should accept children who think outside the box. For this reason, it becomes even more important to cultivate environments that will liberate the individual and develop the creativity of the individual. This is achieved by applying the right education policies and incorporating educational methods that include play in the education process. Doing so helps children develop to their full potential, thereby promoting the development of society as a whole and the production of creative works and acts.

Creative skills are also influenced by individual temperament and character. For example, the fear of making a mistake, especially in people who are shy or insecure, can inhibit creative behavior. This applies equally to T people who are afraid of taking risks and who are disturbed by the feeling of uncertainty. People with perfectionist and success-oriented mindsets may also have difficulties in producing creative and free thoughts. Studies therefore suggest that when children are encouraged to think freely, to act independently, and to make mistakes and learn from them, their self-confidence and creativity both increase.

Conclusion

No far, we have offered theoretical explanations of the P4C method and creativity itself. Given the importance of introducing children to philosophical thinking, we have in recent years been establishing P4C training certificate programs for teachers from all branches in cooperation with Bursa Uludağ University's Continuing Education and Research Center and Department of Philosophy. This 56-hour certificate program contains basic philosophical concepts and problems as well as P4C activities for practice. We conduct the program with groups ranging from 10 to 20 participants, and demonstrate how teachers can apply P4C in their classroom in the hope that they will use this knowledge to foster the creative abilities of their students. Thus, instead of conveying classical knowledge, the program aims to develop critical, creative, collaborative, and caring thinking processes by introducing knowledge that students can engage deeply with. We have not yet collected and evaluated our survey results in their entirety, but the feedback we have received from teachers generally indicates that students' participation in the lesson demonstrates their desire to find knowledge and their increasing ability to think differently. As more teachers introduce P4C exercises and respond to our survey, we expect to receive more comprehensive feedback. At present, our preliminary findings suggest that there is a positive correlation between participation in P4C practices and the development of students' creative thinking.

The studies on P4C that we have conducted over the last three years have found that deeply collaborative interaction between participants and facilitators nurtures creativity and critical thinking. For students to reap the full benefits of P4C lessons, the policies and practices outlined in teaching programs must thus consider how to establish, maintain, and enrich student-teacher relationships, which are the basis of dialogue that fosters philosophical thinking.

References

Bateson P, Martin P (2014) Oyun, Oyunbazlık Yaratıcılık ve İnovasyon. Ayrıntı Yayıncılık, İstanbul.

Chien C Y, Hui A N N (2010) Creativity in early childhood education: Teachers' perceptions in three Chinese societies. *Thinking Skills and Creativity,* 5(2): 49–60.

Cramond, B. (1994). The Torrance Tests of Creative Thinking: From design through establishment of predictive validity. In *Beyond Terman: Contemporary longitudinal studies of giftedness and talent,* eds R. F. Subotnik, K. D. Arnold, 229–254. Norwood, NJ: Ablex.

Cropley A J (1995). Fostering creativity in the classroom: General principles. In *The creativity research handbook.,* Vol. 1, ed. M. Runco, 83–114. Cresskill, NJ: Hampton Press.

Çayır A N (2015) Çocuklar İçin felsefe eğitimi üzerine nitel bir araştırma (Doktora Tezi, Hacettepe Üniversitesi, Eğitim Bilimleri Enstitüsü, Ankara, Türkiye). ttp://tez.yok.gov.tr/UlusalTezMerkezi/'nden elde edilmiştir. (Tez No. 394850)

Direk N (2016) Küçük prens üzerine düşünmek (6. Baskı). İstanbul: Pan Yayınları.

Duffy B (1998). *Supporting creativity and imagination in the early years*. Open University Press.

Gaedi Y (2015) The nature of philosophy for children and its role in teaching and learning, *Philosophy Study,* 5(6): 292–296. DOI: 10.17265/2159-5313/2015.06.004

Gander M J, Gardiner H W (2001) Çocuk ve Ergen Gelişimi (Child and adolescent development). (Çevirenler: Dönmez, A.; Çelen, N.; Bekir Onur). 4.Baskı. Ankara: İmge Kitabevi Yayınları.

Lipman M (1976). Philosophy for children. *Metaphilosophy,* 7 (1): 17–39.

Okur M (2008) Çocuklar için felsefe eğitim programının altı yaş grubu çocuklarının, atılganlık, işbirliği ve kendini kontrol sosyal becerileri üzerindeki etkisi (Yüksek Lisans Tezi, Marmara Üniversitesi, Eğitim Bilimleri Enstitüsü, İstanbul, Türkiye). http://tez.yok.gov.tr/UlusalTezMerkezi/'nden elde edilmiştir. (Tez No. 226445)

Öğüt F (2019) Felsefi düşünmenin önemi ve çocuklar için felsefe (Doktora Tezi, Maltepe Üniversitesi, Sosyal Bilimler Enstitüsü, İstanbul, Türkiye). http://tez.yok.gov.tr/UlusalTezMerkezi/'nden elde edilmiştir. (Tez No. 595272)

Sünbül A M (2000) Yaratıcılık ve Sınıfta Yaratıcılığın Geliştirilmesi. S.Ü. Eğitim Fakültesi Dergisi, 10: 82–94.

Sternberg R J, Lubart T I (1999) The concept of creativity: Prospects and paradigms. *Handbook of creativity,* 1: 3–15.

Ünlüer E (2010) Yaratıcılıkta Erken Çocuklukta Yaratıcılık ve Geliştirilmesi, E. Çelebi Öncü (Edt) de., Pegem Yayıncılık

Ventista O M (2019) An evaluation of the 'philosophy for children' programme: The impact on cognitive and non-cognitive skills (Durham theses, Durham University, School of Education). Available at Durham E-Theses Online: http://etheses.dur.ac.uk/13121/

Wartenberg T E (2009) *Big ideas for little kids: Teaching philosophy through children's literature.* Lanham: The Rowman & Littlefield Publishing Group.

Zachopoulou E, Makri A, Pollatou E (2009) Evaluation of children's creativity: psychometric properties of Torrance's 'Thinking Creatively in Action and Movement' test. *Early Child Development and Care,* 179(3): 317–328.

Zeteroğlu E Ş (2010) Eğitimde Yaratıcılığı Ölçme. Erken Çocuklukta Yaratıcılık ve Geliştirilmesi içinde edt. E. Çelebi Öncü, Pegem yayıncılık, Ankara.

CREATIVITY VERSUS AUTOMATION: TOWARDS THE LAST FRONTIER, AND WITH OUR JOBS ON THE LINE?

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Abstract:
Recently, heated discussions about artificial intelligence, creativity, and work have re-emerged. Despite the dominant focus on the novelty of this entanglement, it is rich with history. In this paper, I will first introduce creativity as a historical and socio-culturally embedded concept, looking at how and why we have invented creativity in the guises we have. The focus will mostly be on the political and ideological backdrop of these historical processes–for instance how creativity was repeatedly cast as the positive counterimage of (industrial and bureaucratic) alienated labour, and hence stood in a complex relationship to automation, robotization, and so on. Based on this I will then discuss a series of scenarios that are related to the (perhaps) forthcoming automation of creativity, more specifically four ways in which automation might in different ways impact (the fields of) creative practices and labour.

Key words: automation, work, creativity, alienation, cultural and creative industries.

Introduction

Recently, heated discussions about artificial intelligence, creativity, and work have emerged. Or, in fact, it would be more accurate to say that they have *re*-emerged. Because under closer scrutiny there are many themes today that are surprisingly similar to previous discussions about automation and robotisation as well as earlier debates about AI, in which concerns about creativity also played a crucial, although sometimes slightly overlooked, role. Regardless of the novelty of these debates—at least for now—the point here is that many of these discussions end up quite huge, as they also seem to be about the future of our societies, of work, business, the economy, and not least: of the role of humans in all this. Some discussions even move on to more fundamental philosophical issues such as: What does it even mean to be human? Is this about to change? Media philosopher David M. Berry has for instance recently pondered “Will AI turn all of us into machines?” (2022), perhaps thereby reversing in tongue-in-cheek manner the classic Turing Test by suggesting that it will not be the machines that will seek to imitate us or try to convince us that they are human-like. It will rather be us that will conform to the logics of the machines. Hence, Berry warns, the danger might be

> that as we shape ourselves to the requirements of the machine to get things done, we also learn to slowly undo the full creative expressive potential of our bodies and language and learn to work within the narrow lines laid down by the computer. […We] adapt ourselves to the machine, and in doing so, we are less expressing ourselves creatively in our full human capacity, and more narrowing our expressiveness to the narrow communications of the machine (Berry, 2022).

The reason why the mere prospect of some potential future ‘artificial creativity’ prompts such profound questions—What are we? What are we becoming?, and so on—has to do with how we have come to perceive creativity, namely as something uniquely and essentially human (cf. Berry's "the full creative expressive potential of our bodies and language"). In the accounts that we have grown accustomed to telling ourselves and each other about the true nature of what constitutes humanity, what makes us special as a species, creativity has become one of those most human things; a 'species-characteristic' as Karl Marx would have it (Wartenberg, 1982). Or as Thomas Ward, research psychologist on creativity and cognition, has put it, thereby echoing mainstream thinking within not only his own and related research fields, but what increasingly has become popular opinion as well: "Humans are, by definition, at their core creative creatures" (Reuter, 2015, p. 77).

This in turn means that computationally automated versions thereof—sometimes referred to as 'creative AI' (Drott, 2021), 'artificial creativity' (Romic & Reimer, 2022), and lately, in the wake of the much-discussed ChatGTP from OpenAI and similar tools: 'generative AI' (Rosenberg, 2022)—would pose some serious philosophical challenges to the anthropological assumption we have become so fond of. The artificial emulation of creativity has become the "final frontier of AI" (Colton & Wiggins, 2012); or as others have put it: creativity is "the final bulwark against the seemingly unstoppable advances of AI" (Arielli & Manovich, 2021, p. 7).

In comparison to Berry, my point will be less pessimistic. As I will argue below, the perception of creativity on which Berry seems to base his scepticism seems somewhat blind to the historical contingency of creativity both as a concept and as a set of practices. He's not alone in this. Defences of human creativity against automated, artificial emulations thereof tend to overemphasise and romanticise the supposed natural, or essential, character of creativity. Still, it is important to pay attention to the fact that any changes in those practices we refer to as 'creative' will have a huge impact–upon the practices themselves, of course; but they will also change our identities, perhaps even our conceptions of humanity at large, since this now often hinges on creativity as our special prerogative. Another reason for this is that creativity, the so-called "true function of man" as Matthew Arnold once labelled it, although hereby only referring to the elect few, is no longer only related to "the best that has been said and thought in the world," that is, high culture and the Arts (cf. Mason, 2003, pp. 197-199). Creativity is now in all nooks and crannies of our everyday lives, not least in our work-lives, and since the societies that we inhabit, despite numerous predictions of the opposite (Roszak, 1978; Weeks, 2011; Taylor, 2018), are still under the spell of the "value-imperialism of work" (Beck, 2000, p. 7), the booming proliferation of creativity here is bound to have broader, immense impact. So, even if CEO of OpenAI Sam Altman had experiments with Generative AI in mind as safe havens when he recently noted on Twitter that it would be "a mistake to be relying on [ChatGPT] for anything important right now"—to which he added "fun creative inspiration; great! Reliance for factual queries; not such a good idea" (Altman, 2022)—I would argue that there is immensely much more at stake than just poetic word salad and funny pictures.

Hence, in the following I will first introduce creativity as a historical and socio-culturally embedded concept, that is, how and why we have invented creativity in the guises we have. Here, I will mostly focus on the political and ideological backdrop of these historical processes, for instance how creativity was repeatedly cast as the positive counterimage of (industrial and bureaucratic) alienated labour, and hence stood in a complex relationship to automation, robotization, and so on. Based on this I will discuss a series of scenarios that are related to the (perhaps) forthcoming automation of creativity, more specifically four ways in which automation might in different ways impact (the fields of) creative practices and labour.

Inventing creativity (and innovation)

When we engage theoretically with issues that involve hyped notions such as 'creativity' and 'AI,' we sometimes tend to lose both our academic soberness and sight of crucial details. The one premise we especially need to keep in mind is this: contrary to how it is mostly being talked about both academically and in our everyday language, creativity—as a concept, as a set of values, and thus also as a specific set of practices performed in quite different fields, domains, or systems, often resulting in various kinds of artefacts or ideas; in short, this whole cluster of things, which we subsume under that one noun, 'creativity'—is itself something that has been invented historically (Reckwitz, 2017; Mason, 2003; Stephensen, 2022a). Before that, we did not have a word for it, nor did we seek to nurture or cultivate it. In fact, most often we did the exact opposite: we tried to hinder or marginalise it socially, for instance by associating creativity (genius) with madness (Becker, 1978; Burwick, 1996). The same tendency can be observed with the related notion 'innovation,' which in recent years increasingly has come to inhabit the same univocally positive cluster of ideas as creativity, whereas it previously was perceived as socially disturbing or even heretical (Godin, 2015).

Furthermore, it is not until after the Second World War that we associate creativity with something quintessentially human in a generic sense, that is, not just something that has to do with individual geniuses (mad or not). Especially during the heyday of the 1960-70s' counterculture the idea of creativity as something characteristic to the human species emerges and becomes mainstream across a range of fields and disciplines, in various sciences as well as within the arts and popular culture (hereby also getting mainstream traction). The implicit reference here to Karl Marx's notion of 'species-characteristics'[1] is non-coincidental, as it was often with reference to his early work, which at the time had just been published for the first time in English, that this line of thought was presented. Perhaps most emphatically in Erich Fromm's anthology of texts instructively entitled *Marx's Concept of Man*, in which he sums up young Marx's primary point concerning 'alienated labour' the following way: "in the process of work, and especially of work under the conditions of capitalism, man is estranged from his own creative powers" (2004/1961, p. 40).

Suddenly we get this idea—or talk it into being—that creativity might be something at the core of our (perceived) nature, something we (supposedly) share, and something that (apparently) differentiates us from other species. Hence, creativity becomes something we could and should pursue, individually and socially, often with explicit reference to this being what being human is all about—or in broader strokes: linked to normative discourses on growth, development, modernisation, civilisation, etc. Given the fact that this idea is introduced in alliance with various strands of New Left, neo-Marxist theory, which in comparison to the drop-out/anti-work movements of the same period are actually quite pro-work, and given the fact that mainstream (capitalist) economics found no immediate reason to object to this part of the equation either, the now supposedly universal human faculty of creativity also becomes linked closely to the world of work: first as its critical negation ('creativity *versus* alienated labour under capitalism), and later as its essence ('creativity at/in work', 'creative industries', etc.).

It is worth emphasising once more that the actual historicity of the concept of creativity is in stark contrast to how we nowadays tend to speak of it. Gradually, it has acquired this chime and status of a transhistorical, universal truth about the nature of Man, often in the guise of what we might label prescriptive or normative anthropologies. But this perception *is* in fact quite new. Michel Foucault once suggested that some ideas over time have become so natural to us that they "tend to feel without history," though once they were unthinkable (1996, p. 139). Creativity as a shared human faculty, as something quintessentially human, and as something that can and must be actualised and maximised, individually and socially, preferably at work, would qualify as such an idea.

Creativity at the dawn of the 21st Century

Given the fact that this idea used to be almost unthinkable, it is remarkable how creativity in the late 20th Century becomes such a dominant aspect of our broader 'social imaginaries' (cf. Taylor, 2002), that is, of our conceptions of what society is and could (and should) become, what kinds of expectations we should have of each other, how we socially and practically fit together, etc. In fact, Andreas Reckwitz even opens his book *Inventing Creativity* by suggesting that this issue of unthinkability has been reversed: "If there is one desire in contemporary society that defies comprehension, it is the desire *not* to be creative" (2017, p. 1). Not wanting to be creative would be considered both immoral and absurd. "Must not any individual, any institution, indeed the whole of society," he continues rhetorically, "strive towards the kind of creative self-transformation for which they would seem, by their very nature, to be predestined?"

Especially since the 1990s, creativity has become pivotal to how we think about both economic and broader societal values, relate it to the future of work, etc., for instance with the notion of the so-called creative or innovation-driven economy, to which creativity is the "lifeblood" that needs to be fostered, as the president of the Academy of Art University in San Francisco Elisa Stephens argues in a recent op-ed in the technology and business maga-

[1] Erich Fromm notes that "What Marx means by 'species-character' is the essence of man; it is that which is universally human, and which is realized in the process of history by man through his productive activity" (2004/1961, p. 29).

zine *Fast Company* (2022). Here she simply echoes a conception perpetuated by all those creativity-related institutions that, since the middle of the twentieth century, have emerged and which, seen from a (critical) sociological perspective, primarily seem to be in the business of maintaining and promoting the idea of creativity (and often also boosting it). These institutions, in the broad (both material and immaterial) sense of the word, altogether constitute what Reckwitz has labelled the 'creativity complex,' and are primarily in the business of defining, and hence performatively enacting, 'creativity'—or in fact: numerous creativit*ies* (cf. Stephensen, 2022a; 2022b). As a consequence the scenario of intermingling creativity, work, the economy, and societal formations in general, which recently has also been expanded to encompass the future prospect of being AI-driven, has captured our imagination about who we are, how we fit together, what we could and should expect of each other and of ourselves, etc. It has become a goal, individually and socially, something we *should* pursue, because it is almost univocally seen as both good and natural; hence also the assumption that more of it is even better. If 'be creative!' has become an individual imperative (McRobbie, 2016; Reckwitz & Kroll, 2013), its collective or societal equivalent certainly would be, 'become *even more* creative!' It is hard not to think of the current hype about generative AI as part of this craving for efficiency.

Sociotechnical imaginaries: positive prescriptions and negative ghosts

The creative imperative, which most of us, individually and/or collectively, face these days, is also related to another underlying assumption, namely that whatever societal ills we might be encountering, they are either based in some sort of 'creativity deficit/crisis,' or alternatively: that these ills might be overcome with creativity-slash-innovation-based fixes. In this sense, thinking about creativity has also become part and parcel of our thinking about the future, and often perceived as an overcoming of the present. Emad Mostaque, founder and chief executive of Stability AI, which builds the hugely popular deep learning text-to-image model Stable Diffusion (released in 2022), has for instance explained the *raison d'être* of their project the following way: "So much of the world is creatively constipated, and we're going to make it so that they can poop rainbows" (Golumbia, 2023).

Drawing on Taylor's abovementioned idea of 'social imaginaries,' Sheila Jasanoff has introduced the notion of so-called 'sociotechnical imaginaries,' which could be useful to make sense of the visions we have and articulate about the societal implications of technologies. This notion is relevant both in relation to the idea of AI and automated creativity discussed here, and in relation to new technologies and ways of implementing them, which more generally are thought of as having their origin in creative processes of innovation and invention (cf. Simondon, 1958/2017). Jasanoff defines such sociotechnical imaginaries as:

> collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology (2015, p. 4).

These latter advances in science and technology could, as just mentioned, include those scientific knowledge regimes about and technologies of AI, machine learning, etc. But it also pertains to those that have to do with creativity in general (cf. the fact that creativity research is a booming field which includes lots of technologies too, ranging from the search for 'creativity genes' and brain-scans in order to locate where creativity sits in the brain, to the more recent interest in using AI as a way of 'reverse-engineering' creativity, that is, making emulations thereof in order to know more about how purely human creativity works (Stephensen, 2020)). Furthermore, these imaginaries are entangled with broader categories and other scientific systems and socio-cultural technologies, including economic modelling, political philosophies about how we should arrange our societies, media and pop-cultural representations of these issues, etc. It is in this context that the question of AI and automated creativity emerges as part of a specific sociotechnical imaginary that has to do with the future of making and working–on some levels in novel ways, but on other levels in ways rich with history.

Such sociotechnical imaginaries are not just ways of imagining future practicalities. Although typically taking the form of positive descriptions of how the future (almost certainly) will look like, they are deeply prescriptive and normative as well. Hence, Jasanoff notes, they "encode not only visions of what's attainable through science and technology but also of how life ought, or ought not, to be lived;

in this respect they express a society's shared understandings of good and evil" (2015, p. 4).

Even though sociotechnical imaginaries mostly are "futurescapes that collectives actively wish to embrace," (Jasanoff, 2016, 84) and therefore typically are oriented towards how to enact these visions, it is worth noting that there are many dystopias as well. These dystopian imaginaries, which we might label 'sociotechnical ghosts,' function as guidelines for collective action too; as negations or inversions, one might say, of what could or should have been. Or of what used to be. For instance, as we will also return to below, there is the scenario, when specifically speaking of AI, that such a machinic, technological, automated, artificial creativity might spell the end of *proper* human creativity. Such scenarios are often, as is the case here, rooted in a somewhat counterfactual nostalgia, since that specific perception of creativity as something quintessentially human has not always been with us; and which furthermore, looking back, was in fact itself an idea produced as part of a sociotechnical imaginary that pitched the realisation of our (supposedly) creative humanity up against alienated labour under industrial capitalism. So, in this sense, this current tendency to preserve a truly human creativity comes across as weirdly out of time and place: not really a longing for something that truly was, but rather a longing for a belief that it was like that—or in fact: a belief that held that this is how it should be.

Automation, cultural production, and authorial rights

Despite the dialectic with such negative "ghosts," the idea of automated artificial creativity is still predominantly entangled in *positive* visions of human-machine symbiosis directed at the task of maximising creativity (since it is good, and more of it is better). Below, I will return to some of these visions and their interplay. Before that, however, I will briefly focus on one area in which the prospect of an automated artificial creativity raises some particularly pressing and complicated problems, namely in the fields of the so-called cultural and creative industries (CCI), which in recent years have been hailed globally as 'future growth industries' both in terms of Gross National Income and in terms of employment.

Here, complications especially emerge when machine learning algorithms are trained to create art autonomously, so to speak. An illustrative example of this is the much-debated case of *The Portrait of Edmond de Belamy* (2018), where the French artist group Obvious trained a GAN-algorithm on a dataset consisting of portrait paintings of a specific period in order to produce a series of portraits on its own. One of these was subsequently sold at a Christie's auction for the astonishing price of $430,000 (Stephensen, 2019). In relation to this case, some quite classical aesthetic and philosophical questions immediately emerge: How do we relate to what these cultural products mean or express when they are (just) the product of artificial entities? Will we, for instance, show the same willingness to fill in the blanks and guess/decode intended/encoded meanings? and so on. And, of course, standard questions such as: Is this really art at all? Can machines be artists? Will this spell the end of the human prerogative as the creative being?

To make matters even more complicated, it turned out that Obvious had used a slightly modified version of a code written by someone else (Ian Goodfellow), which caused further debate (Vincent, 2018). In addition to the already mentioned discussions which were of a mostly philosophical nature, this fact about a small snippet of code also raises the thorny issue of ownership, immaterial rights, and enumeration as well: To whom does this belong? Who should get the credit? Who gets to profit—or more modestly: gets to make a living—from it?

As indicated, these issues become particularly pressing since one of the core definitions of those booming growth industries we have come to refer to as CCI pivots on intellectual property rights like patents, trademarks, and copyrights (Howkins, 2001; Waelde & Brown, 2018). Keeping this complex of economic agendas and cultural work together gets complicated when the pillar of intellectual ownership, namely authorship (Woodmansee 1984), is brought into question, that is, when artificial actants act as (co-)producers of cultural/creative products (Navas, 2020; Gervais, 2020; Ginsburg, 2018; Spindler, 2019; Yanisky-Ravid, 2017; Yanisky-Ravid & Xiaoqiong, 2018; Abbott, 2022). Moreover, this in turn potentially disrupts our entire system of taxing wage-labour as well, which of course has even broader societal implications, especially from a welfare society perspective. For this reason, the issue of artificial authorship in specific relation to the CCI is being debated–for instance, on the level of the European Union (European Commission, 2020) and World Economic Forum (2018b).

In fact, even when the machines, software, algorithms are merely used as creativity-enhancing or -

assisting tools or instruments—or as some would have it: when they function as our creative 'collaborators' or 'partners'—it is not without socio-economic-political problems either. Automated tools for creative production have become so integral to almost all our processes and practices that they, often without us really noticing it, tend to shape, precondition, or nudge the aesthetic expression of 'our' creativity in certain directions, for instance through proposed workflows and those easiest-to-do actions which the interface affords us through drop-down folders, pop-up windows and such, once again reopening the question of authorship and ownership. Even if these AI-based technologies are not replacing the artist in the full romantic, 'heroic' sense, they still quite substantially impact the creative ecologies of CCIs as fields of labour, as sectors, as business, as industries, and as economies. And they impact them in such ways that they increasingly become fields of political struggles over ownership and intellectual property rights, as well as over broader labour rights, forms of employment, pay and enumeration, and so on. And these aspects are important to keep in mind. Creativity is not just something seemingly innocent and isolated from everyday life, which is how we would normally tend to think of it (when forgetting about its prehistory). Creativity is, and has always been, heavily loaded with politics, economy, and power.

Four imaginaries concerning work, creativity and (AI-based) automation

Although the CCIs are often hailed as the future growth sectors of a new 'innovation economy,' they are still embedded within a broader landscape of economic activities and work practices, from which they are not isolated. If we look at this in more general terms and beyond just the still fairly restricted fields of cultural and creative production, there seem to be four different scenarios (or sociotechnical imaginaries) circulating that address how AI-driven automation will impact work in general, and by implication, those productive activities we label 'creative'–for instance by affecting the balance between 'creative' and 'non-creative' work.

Imaginary #1: Increasing the realm of freedom

According to the first imaginary, new technologies will gradually free us from tedious, strenuous work, or as it is termed in Marxist lingo: 'alienated' (and hence also 'alienating') labour. Through increased efficiency and time-saving, the outsourcing of specific tasks to machines will proportionally reduce the 'realm of necessity' and hereby increase the 'realm of freedom' (as Karl Marx put it in his late work *Capital* (1977/1864, p. 820)). In short: this will leave us with more free time for other activities, including creative pursuits; either within the framework of a 'leisure society' (Dumazedier, 1967), or within a 'multi-activity society' in which paid labour ranks as only one kind of activity among others (Beck, 2000, pp. 57-61).

The assumption here obviously seems to be that the societal and labour-market consequences of these transformations will be shared in solidarity, at least if it is to be interpreted as a positive transformation. But its proponents especially today fail to suggest *how* or *why* this societal state of "fully automated luxury communism," as David Graeber (2018, p. 297) mockingly labels it, suddenly should happen. Marx himself suggested that this would occur in a postcapitalist/communist society, in which man will be free to "hunt in the morning, fish in the afternoon, rear cattle in the evening, criticise after dinner" (2004/1844, p. 159), exactly as he (or she) pleases. In contrast, the economist John Maynard Keynes (1931) for instance suggested it would be capitalism that in a foreseeable future would make it so that that "three-hour shifts or a fifteen-hour week" would suffice. At the same time, however, he also feared that capitalism-driven automation might lead to so-called 'technological unemployment.'[2] So, according to Keynes, the future prospects really were up to political decision-making, whereas for Marx they would be up to a combination of historical determinism (the inevitable historical implosion of capitalism) and revolution at the hands of the rising proletariat.

Obviously, the society we live in neither resembles Keynes' vision of a fifteen-hour week, nor the one Marx supposedly had in mind with the reduction of the realm of necessity, nor for that sake the post-capitalist imaginaries of a world without work of Srnicek & Williams (2015). If we look at the sheer

[2] Keynes defines 'technological unemployment' as "unemployment due to our discovery of means of economizing the use of labor outrunning the pace at which we can find new uses for labor " (1931, p. 364). According to Graeber, this mass-unemployment from automation has, in fact, occurred. But we have, as he puts it, "simply stopped the gap by adding dummy jobs that are effectively made up," that is, through the constant replacement of genuine productive work with pointless, paper-pushing 'bullshit jobs' (2018, p. 301). See also Beck (2000, pp. 39-40).

amount of labour being churned out on a daily basis, it seems fair to argue that automation so far has not delivered. In fact, rather than producing more free time and thereby expanding the realm of freedom, new technologies of production, organisation, and consumption (AI-based or not) generally seem to have increased both productivity *and* the overall acceleration and escalation of all sorts of processes in societal, cultural, and individual life, as has critically been pointed out by sociologist Hartmut Rosa (2013). Not only has the realm of (seeming) necessity expanded even further, but paradoxically, it has also added increased alienation to the mix, which, as mentioned above, is exactly that condition which many of our contemporary conceptions of creativity were invented as a critical negation of. Nonetheless, this imaginary is one of the most frequently evoked in current debates on what automation (AI-based or not) might do for us: minimise the tedious tasks.

Imaginary #2: Transforming the nature of work itself

The second imaginary, which historically runs more or less parallel to the first one, stresses that the introduction of these new technologies could transform the very nature of work—of *all* work—so it becomes less tedious (and alienated/alienating), and hence more creative: a general 'creative job enrichment,' so to speak. This idea is most prevalent in the early writing of Karl Marx (e.g., in his so-called *Economic and Philosophic Manuscripts,* written in 1844). These texts were read extensively during the 1960-70s when the manuscripts were first widely published in English (cf. Fromm, 2004/1961); that is, at the same time that the very idea of creativity as Man's species-characteristic emerged. Hence, almost simultaneously, there emerged both the idea of technologically transformed work as *the* site in which Man could realise himself in and through activities of so-called "free, conscious activity," where unalienated man, like the (Romantic) artist, would be free to create "in accordance with the laws of beauty" (Marx, 2004/1844, p. 84); *and* the idea that this is socio-psychologically and politically important to man in general, that is, to all of us, because it's our nature. Which is no coincidence, as the accusation against capitalism and its societal institutions as inhumane relied on a positive counter-ideal. Hence, creativity becomes that authentically human thing which a hostile, economic system smothers, and which a more humane techno-social order might reinvigorate.

The contemporary version of imaginary #2, which stresses the idea of AI-transformed work towards more creative practices, is clearly in continuation of this line of thought. Take for instance the following passage from an interview with Amazon's vice president for AI services, Vasi Philomin, in which he comments on the future change of the work process of software development, stating that

> [it's] possible developers may not need to learn the syntax and vocabulary of programming languages, and instead will need to focus on understanding concepts and systems to design programs while the AI can do all the boring, nitty-gritty coding work (Quach, 2022).

In short: a fundamental shift from boring, repetitive, and potentially alienating coding labour, towards creative, and implicitly much more fulfilling, work.

This is also how digital technologies in general are often sold to us: as the chance to identify ourselves as 'creatives.' This is perhaps most notably the case with the Apple computer–the Harley Davidson of the creative class–which was launched as a creative 'freedom-machine' that could help you to 'think different,' according to the company's (former) slogan (1997-2002). Thus, digital technologies (AI-based in various degrees) assist us in becoming what we supposedly were destined to be by nature: creative–and now even *in*, *at*, and *through* work.

Seen from the perspective of critical sociology, this rosy picture raises some red flags and sceptical questions: are we really all creative? And should we be? Or could all this talk of 'creativity in/at work' perhaps also be read as some kind of work ethic discourse that makes us run that extra mile, accept precarious working conditions, and so on? (cf. Beder, 2000; Heelas, 2002; McRobbie, 2016). Or, expanding upon Reckwitz: is this just a way of stacking yet another layer upon the 'performance pressure' of creativity? (Reckwitz & Kroll, 2013).

Imaginary #3: Taking our jobs (and making us all redundant)

In contrast to the first two scenarios, the third is more dystopian. It suggests that these technologies potentially will make us all redundant, not only through the automation of all the tedious work (as in imaginary #1), but eventually also through the full automation of creativity. This scenario is typically related to the potential development of so-called

AGI (Artificial General Intelligence), which aims to make AI just as competent as its human creators in completing *all* tasks (including writing/creating new code itself), not just within the narrow parameters set by tasks such as playing board games. This is also the overall ambition of OpenAI (the company behind ChatGPT and Dall-E2), at least according to its CEO Sam Altman: "We're here to make AGI, not image generators" (Heaven, 2022).

This austere imaginary comes in all shapes and sizes. At the one end of the scale, there's Ray Kurzweil's dystopian science fiction-like notion of 'the singularity' (2005), which refers to the moment machines are able to outperform us in the execution of all tasks and functions, including creativity (cf. AGI). This narrative sometimes takes on rather extreme forms, for instance with a *Terminator* perception of the inevitable "AI-Apocalypse," in which humans become entirely irrelevant and expendable, and our survival as a species ultimately relies on the grace of the machine and whatever tasks they will come up with to make us useful, if at all. In a slightly less dystopian vein, Langdon Winner once also noted that another pressing problem with automation, given the fact that work has become the primary site of identity and meaning making, would be that "people would be left with absolutely nothing left to do or be" (Beder, 2000, p. 267), which thereby also critiques the pivotal position work has come to occupy in late modern life.

But this (dystopian) sociotechnical imaginary also haunts many current debates on whether or not new AI-based technologies like the recent ChatGPT could be the beginning of the end of the fields and businesses of artmaking and creativity. For instance, it seems to prompt Sofian Audry, the author of *Art in the age of machine learning* (2021, p. 5), to seek to debunk two myths concerning machine learning, AI, art, and creativity: (1) that machine learning will soon give rise to superhuman intelligence and creativity; and (2) that machine learning could therefore create art without an artist. Somewhat ironically, however, his arguments are based on rather commonsensical—and more importantly, historically contingent—"essentialist" ideas about the nature of creativity and how art comes about: first, that creativity is 'thinking outside the box,' and second, that the tasks and decision-making necessary for an AI to create an artwork *must* be done by an 'artist'(why not an engineer or a curator, instead?), hence the need for the artist's continued existence . Like so many others in this field, he does not present any real arguments as to why these ideas should stand as absolute and universal (e.g., the fixed definition of 'creativity') or rely on transhistorically unwavering categories (e.g., art is made by artists, and not another kind of creator, period). In contrast to the idea of the disappearing human artist in the face of increasingly sophisticated technology, Eric Drott has argued, that "the trouble creative AI presents to contemporary copyright regimes"—to which we should also add labour market issues in broader terms—"doesn't stem from a lack of human involvement, as machines become creative agents in their own right. Rather, the trouble stems from an excess of human involvement, from the complexity of the network of human and nonhuman actors in which creative AI is entangled" (2021, p. 198). Drott makes this argument with reference to Yanisky-Ravid's extensive, yet far-from-exhaustive list of contributors to so-called 'creative AI'-systems, which in addition to their programmers, includes "data suppliers, trainers, feedback suppliers, holders of the AI system, system operators, employers or investors, the public, and the government" (2017, p. 692). Insisting, like Audry, on the figure of 'the artist' as *the* privileged, indispensable human maker of art in this ensemble—or even worse: applying the label of 'artists' to all of these agents (according to the logic that, if they made it, they must be artists)—comes across as imprecise. Additionally, in socioeconomic terms,, it probably does a disservice to all of these people, given that 'artist' is not, and never has been, a lucrative or stable occupation, with relatively few exceptions (cf. Menger, 2006).

Imaginary #4: Reinforcing existing socioeconomic divides

These issues finally bring us to the fourth imaginaryl according to which, technologies of automation will largely reinforce existing socioeconomic divides–for instance, by making certain ways of earning a living unsustainable, whilst privileging other livelihoods. According to most proponents of this scenario, this is good news for some, namely the creatives, especially the tech-savvy ones; whereas it's much worse news for those in the service industry or on the assembly lines, whose work has long been broken down into unskilled, easily automatable, discrete tasks, only to gradually wither away (cf. Braverman, 1974; Rifkin, 1995).

In the report *Creativity VS Robots*, Nesta claims that creative occupations are "more future-proof to computerization" than other sectors of the labour market (Bakhshi et al., 2015, p. 6). Much the same story comes from Stuart Cunningham, who has been one of the main proponents of the creative industries-approach in Australia. He predicts that an Arts degree (and the creativity that supposedly could derive from this) will not only "save us [sic!] from the robots," but in fact robotisation and automation could mean that "opportunities would grow for creative pursuits to become more crucial"–in particular for those "in the arts and other creative industries," especially if their degrees come with a tech-ad on (Canning, 2016). Somewhat in the same vein, Scott Belsky (2019), chief product officer at Adobe, argues that we should nurture so-called 'creative literacy' in schools, rather than 'machine thinking' (although it should be noted, he does think Adobe's software packages might come in handy for this). The argument that follows from this fourth imaginary is that we should intentionally focus on educating the younger generation in preparation for creative (in a broad sense) kinds of work in order to future-proof not only young people's individual prospects for employment, but also the economic health of our societies generally. The same argument is found in Webster and Ivanov (2019), who, drawing on the World Economic Forum's *The Future of Jobs Report* (2018a), argue that "education will have to work in ways to cultivate those talents that only humans at this point in time can develop in ways that are useful in the economy (creativity, complex communication skills, emotional intelligence, etc.)," whereas "those lacking the skills to compete in the new economy"—and here it is even suggested that this might be a question of innate abilities such as intelligence (IQ)—will be left to their own device "competing against each other" (2019, pp. 135-136), and against the machines, of course.

Despite the tendency in some of these to downplay the species-general aspect concerning creativity, it is obvious that they still take their basic cue from the idea of creativity—although often based in fairly cliché-ridden, mystifying conceptions of creativity as "doing the unexpected," "thinking outside the box," and so on—as that distinctly human thing which machines will *never* be able to achieve (or at least not within the foreseeable future). This is asserted as a matter of fact in need of no further reasoning and justification since it is presumed to be common sense, a shared assumption, something we just know to be true about the nature of humans. Proponents of this perspective also tend to assume that these views are grounded in objective facts and standards. But there is no absolute gold standard for creativity. What constitutes a creative praxis or product is not something fixed once and for all, or for that matter, fixed within any given time. If creativity *is* anything at all, it is contextual. What and who can be regarded as creative (or not) are questions that, to say the least, are highly debatable and influenced by a host of factors, including workplace power dynamics, leadership whims, etc. (Ericsson, 2001). Our understandings of creativity are loaded with (office) politics, ideology, and normativity—although typically cloaked in descriptive certainty.

Conclusion: Changing creativity?

This, of course, brings us back to the issue of reinforcing and/or reproducing existing socioeconomic divides (the fourth imaginary). But it also underscores Berry's point at the beginning of this article, namely that our practical entanglements with various AI-technologies are bound to change our practices and processes, our roles, our tastes, and our conceptual understandings of the world we live in, and eventually also of ourselves. The current interest in automating creativity seems folded into sociotechnical imaginaries about the effectivisation and maximisation of creativity (e.g., the more creativity, the better, etc.), whereas other understandings of creativity and its relation to individual and social life are based on the perception of creative productive activity as meaningful in and of itself, hence constituting an image of a non-alienated work-life (or outside work). Given the contingency of 'creativity'(i.e., that it's a set of concepts and practices and so on that we have invented in a number of specific forms throughout history), it would not be meaningful to argue that one of these understandings is more correct than the other. Or that its automation might constitute a reduction (or an expansion) of creativity *per se*. Yet, we should, at a minimum, be aware of the fact that subscribing to one view rather than another—or on a more practical level, entangling the processes we label 'creative' with a given technology—is not without consequences, and that these consequences extend far beyond the domains, practices, and modes of being we would usually associate with 'creativity.' Nor should we ignore the historicity of these discussions.

References

Abbott R (Ed.) (2022) *Research Handbook on Intellectual Property and Artificial Intelligence*. Cheltenham: Edward Elgar Publishing Limited.

Altman S [@sama] (2022, December 11). ChatGPT is incredibly limited…[text] Twitter. Retrieved from https://twitter.com/sama/status/1601731295792414720

Arielli E, Manovich L (2021–22). *Artificial aesthetics.* Retrieved from http://manovich.net/index.php/projects/artificial-aesthetics

Audry S (2021) *Art in the age of machine learning*. Cambridge, Mass.: The MIT Press.

Bakhshi H, Frey C B, Osborne M (2015). *Creativity VS. robots: The creative economy and the future of employment*. London: Nesta.

Beck U (2000) *The brave new world of work*. Cambridge: Polity Press.

Becker G (1978) *The mad genius controversy*. Newbury Park: Sage.

Beder S (2000) *Selling the work ethic.* London: Zed Books.

Belsky S (2019, January 23) How to thwart the robots: unabashed creativity. *Fast Company*. Retrieved from https://www.fastcompany.com/90294821/how-to-thwart-the-robots-unabashed-creativity.

Berry D M (2022, February 7). AI is turning us into machines. *Iainews*. Retrieved from https://iai.tv/articles/ai-is-turning-us-into-machines-auid-2044

Braverman H (1974) *Labor and monopoly capital: The degradation of work in the twentieth century*. New York: Monthly Review Press.

Burwick F (1996) *Poetic madness and the romantic imagination*. University Park, PA: The Pennsylvania State University Press.

Canning S (2016, August 24) Creativity will save us from the robots, QUT professor predicts. *Mumbrella*. Retrieved from https://mumbrella.com.au/creativity-will-save-us-robots-qut-professor-predicts-389791

Colton S, Wiggins G A (2012) Computational Creativity–The Final Frontier? In: *Proceedings of the 20th European Conference on artificial intelligence,* eds L. de Raedt, C. Bessiere, D. Dubois, P. Doherty, 21–26. Amsterdam: IOS Press.

Drott E (2021) Copyright, compensation, and commons in the music AI industry. *Creative Industries Journal,* 14(2): 190–207.

Dumazedier J (1967) *Toward a society of leisure*. New York: Free Press.

Ericsson D (2001) Creative Leaders–or prisoners of the past? In *Invisible management,* eds S.-E. Sjöstrand, J. Sandberg, M. Tyrstrup 188–211. London: Thomson Learning.

European Commission (2010) *Unlocking the potential of cultural and creative industries*. Brussels: COM. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri =CELEX:52010DC0183&from=BG

European Commission (2020) *Trends and developments in artificial intelligence communications networks, content and technology: Challenges to the intellectual property rights framework*. Brussels. Retrieved from https://op.europa.eu/en/publication-detail/-/publication/394345a1-2ecf-11eb-b27b-01aa75ed71a1/language-en

Foucault M (1996) Nietzsche, genealogy, history. In *Language, counter-memory, practice: Selected essays and interviews,* ed. D. F. Bouchard, 139–164. Ithaca: Cornell University Press.

Fromm E (2004/1961) *Marx's concept of man*. London: Continuum.

Gervais D (2020) Is intellectual property law ready for artificial intelligence? *GRUR International,* 69(2): 117–118.

Ginsburg J C (2018) People not machines: Authorship and what it means in the Berne Convention. *International Review of Intellectual Property and Competition Law,* 49(2): 131–35.

Godin B (2015) *Innovation contested: The idea of innovation over the centuries*. New York: Routledge.

Golumbia D (2022, December 14) ChatGPT Should Not Exist. *Medium*. Retrieved from https://davidgolumbia.medium.com/chatgpt-should-not-exist-aab0867abace

Graeber D (2018) *Bullshit jobs: A theory*. New York: Simon & Schuster.

Heelas P (2002) Work ethics, soft capitalism and the 'turn to life.' In *Cultural economy: Cultural analysis and commercial life,* eds P. du Gay, M. Pryke, 78–96. London: Sage.

Howkins J (2001) *The creative economy: How people make money from ideas.* London: Penguin Press.

Jasanoff S (2015) Future imperfect: Science, technology, and the imaginations of Modernity. In *Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power,* eds S. Jasanoff, S.-H. Kim, 1–34. Chicago: The University of Chicago Press.

Jasanoff S (2016) Perfecting the human: Posthuman imaginaries and technologies of reason. In *Perfecting human futures: Transhuman visions* *and technological imaginations*, eds J. B. Hurlbut, H. Tirosh-Samuelson, 73–96. Springer: Wiesbaden.

Keynes J M (1931) Economic possibilities for our grandchildren. In *Essays in Persuasion,* 358–373. New York: Macmillan.

Kurzweil R (2005) *The singularity is near*. New York: Penguin Group.

Marx K (2004/1844). Economic and philosophic manuscripts: Alienated labour. In *Marx's concept of man,* ed. E. Fromm, 78–90. London: Continuum.

Marx K (1977/1864). *Capital Vol. III.* New York: International Publishers.

Mason J H (2003) *The value of creativity*. Aldershot: Ashgate.

McRobbie A (2016) *Be creative: Making a living in the new culture industries*. Cambridge: Polity Press.

Menger P-M (2006) Artistic labor markets: Contingent work, excess supply and occupational risk management. In *Handbook of the Economics of Art and Culture, Volume 1,* eds V. A. Ginsburgh, D. Throsby, 765–806. Amsterdam: North-Holland.

Navas S (2020) Creativity of algorithms and copyright law. In *Algorithms and law,* eds M. Ebers, S. Navas, 221–234. Cambridge: Cambridge University Press.

Quach K (2022, 26 September). AI won't take coders' jobs. Humans still rule for now. *The Register*. Retrieved from https://www.theregister.com/2022/09/26/in-brief-ai/

Reckwitz A, Kroll F (2013) Creativity hysteria: Creativity has become a kind of performance pressure. *Goethe Institute*. Retrieved from https://www.goethe.de/en/kul/ges/20368887.html

Reckwitz A (2017) *The invention of creativity.* Cambridge: Polity Press.

Reuter M E (2015) *Creativity: A sociological approach*. Houndmills: Palgrave Macmillan.

Rifkin J (1995) *The end of work*. New York: Putnam.

Romic B, Reimer B (Eds) (2022) Artificial creativity. Special Issue of *Transformations, 36.*

Rosa H (2013) *Social acceleration: A new theory of modernity*. New York: Columbia University Press.

Rosenberg L (2022, December 20) Generative AI: The technology of the year for 2022. *Bigthink.* Retrieved from *https://bigthink.com/the-present/generative-ai-technology-of-year-2022/*

Roszak T (1978). *Person/Planet: The creative disintegration of industrial society*. New York: Anchor Press.

Sayers S (1998) *Marxism and human nature*. London: Routledge.

Simondon G (2017/1958) *On the mode of existence of technical objects*. Minneapolis: Univocal.

Spindler G (2019) Copyright law and artificial intelligence. *International Review of Intellectual Property and Competition Law,* 50(9):. 1049–1051.

Srnicek N, Williams A (2015) *Inventing the future: Postcapitalism and a world without work*. London: Verso.

Stephens E (2022, December 17) Why creativity is the top skill you need for guaranteed career success. *Fast Company.* Retrieved from https://www.fastcompany.com/90818131/creativity-soft-skills-career-success-ai

Stephensen J L (2019) Towards a philosophy of post-creative practices? Reading Obvious' 'Portrait of Edmond de Belamy.' In *Proceedings of politics of the machines: Art/Conflic,t* eds M. Søndergaar , L. Beloff, H. Choubassi, J. Elias, 21–30. Beirut: Science Open.

Stephensen J L (2020) Post-creativity and AI: Reverse-engineering our conceptual landscapes of creativity. In *Proceedings of the 11th International Conference on Computational Creativity,* eds F. A. Cardoso, P. Machado, T. Veale, J. M. Cunha, 326–333. Coimbra: ACC.

Stephensen J L (2022a) *Creativity.* Baltimore: Johns Hopkins University Press.

Stephensen J L (2022b) Artificial creativity: Beyond the human, or beyond definition? *Transformations,* 36: 19–37.

Sternberg R J (2005) Creativity or creativities? *International Journal of Human-Computer Studies,* 63(4–5): 370–382.

Taylor C (2002) Modern social imaginaries. *Public Culture*, 14(1): 91–124.

Taylor S (2018) Beyond work? New expectations and aspirations. In *The new normal of working lives: Critical studies in contemporary work and employment,* eds S. Taylor, S. Luckman, 328–345. Cham: Springer.

Vincent J (2018, October 23) *How three French students used borrowed code to put the first AI portrait in Christie's*. The Verge. Retrieved from https://www.theverge.com/2018/10/23/18013190/ai-art-portrait-auction-christies-belamy-obvious-robbie-barrat-gans

Waelde C, Brown A E L (Eds) (2018). *Research handbook on intellectual property and creative industries*. Cheltenham: Edward Elgar Publishing Limited.

Wartenberg T E (1982) ‘Species-Being’ and ‘human nature’ in Marx. *Human Studies,* 5(2): 77–95.

Webster C, Ivanov S (2020) Robotics, artificial intelligence, and the evolving nature of work. In *Business transformation in data driven societies,* eds B. George, J. Paul, 127–143. Cham: Palgrave-MacMillan.

Weeks K (2011) *The problem with work: Feminism, Marxism, antiwork politics, and postwork imaginaries*. Durham, NC: Duke University Press.

Woodmansee M (1984) The genius and the copyright: Economic and legal conditions of the emergence of the ‘author.’ *Eighteenth-Century Studies,* 17(4): 425–448.

World Economic Forum (2018a) *The future of jobs report 2018*. World Economic Forum. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf

World Economic Forum (2018b) *Creative Disruption: The impact of emerging technologies on the creative economy*. World Economic Forum. Retrieved from http://www3.weforum.org/docs/39655_CREATIVE-DISRUPTION.pdf

Yanisky-Ravid S (2017) Generating Rembrandt: Artificial intelligence, copyright, and accountability in the 3A era—The human-like authors are already here—A new model. *Michigan State Law Review,* 4: 659–726.

Yanisky-Ravid S, Xiaoqiong L (2018) When artificial intelligence systems produce inventions: An alternative model for patent law at the 3A era. *Cardozo Law Review,* 39(6): 2215–2265.

TOWARDS A NEW COMPUTATIONAL AESTHETICS OF CREATIVE SOFTWARE

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Abstract:

This paper[1] proposes a deep analysis of the latest research of digital humanities scholar Beatrice Fazi, and especially her critique of computational automation, to understand the roles of digital creative technologies, and more specifically of creative software. After a close analysis of Fazi's main contribution to a new understanding of computational aesthetics, we will briefly outline the potential implications of her work to understand the contemporary evolution of creative software, and especially the implementation of machine learning algorithms in these kinds of software. This will lead us to contextualise the contemporary anxieties regarding how machines could replace humans in the act of artistic creation.

Key words: Beatrice Fazi; Alfred North Whitehead; Computational Aesthetics; Computational Automation; Creative Software.

1. Introduction: Machinic emergences and human agency in artistic practices.

With the fast progression of AI, numerous critical discourses cast machines as potential substitutes for artists. These discourses rightfully point to the rapid development of computational technologies in various fields of human activity (including artistic creation), bypassing any phenomenological steps that would allow humans to follow what is going on inside the blackbox of computational technologies. These discourses also lead less fruitfully to various forms of anthropomorphisation of machines, reminiscent of the dated conception of artificial intelligence as an imitation of human intelligence. Eventually, it is argued, the computer will take on the role of the artist, and its agency as a machine will be indistinguishable from the agency of the human artist in creating a work or a performance. This caters to a field of computational creativity that seeks to develop the creative abilities of the computer.

Before we can assess what is at play here, we must define what it means to be an artist, or to act as an artist. The range of phenomena that are defined as artistic have changed during different historical periods. Artists themselves have constantly searched to redefine art. Some definitions of art focus on the virtuosity of the artist in manipulating media; some definitions are focused on the idea or the concept underlying the artistic project. For instance, in conceptual art, the concretisation/materialisation of the artwork is a perfunctory affair, yet, the artist even in the case of conceptual art, is a sentient being situated in a specific mental and physical context. Marcel Duchamp defined the creative act according to the artistic coefficient (Nakamura & Gunji, 2020). This artistic coefficient precisely points towards the discrepancy between:

[1] The work presented in this paper was supported by a grant from the Research Grants Council of the Hong Kong Special Administrative Region, China (Project No. CityU11614519)

- the intention of the artist (what she wants to do),
- the unconscious dimension that impinges to some extent on the conscious agency of the human artist,[2] , and
- the frictions of the actual world, which entail certain concretisations in the artwork that were not planned by the artist, but which nevertheless come to be part of the artwork.

The deep sentient situatedness of the artist seems consubstantial to the process of human artistic creation. The question of whether machines can approximate this form of situated creativity relates to the simulation paradigm stemming from multiple interpretations of Turing's work on computers: the machine is considered to think if it can approximate human forms of (creative) thinking.

Through a close analysis of the latest theoretical writing of Beatrice Fazi and reference to the past work of Luciana Parisi on parametric architecture, we attempt to move away from the tendency toward anthropomorphising computational technology, but also from views which consider computational technologies as based exclusively on discreteness and iterative processes leading to the reproduction of the same. Fazi contends that we should evaluate computing technologies on their own terms. Such a perspective raises a number of questions. For example, what are the forms of connections that are created when the human artist considers the capacity of computing technologies to yield emergences on their own terms, without analogy or link to any form of human (felt, sentient) creativity? What are the implications of Fazi's philosophical posture for contemporary creative acts regarding the increasing integration of big data and artificial intelligence in the creative software used by creatives and artists?

2. Going beyond automation as a substitute for the human in repetitive and mundane tasks

As highlighted by McCormack (2012), the term automation emerged in the 1940s in the United States and it referred to the creation and use of machines to perform tasks usually performed by humans. He notes that the concept of automation remained paramount in many forms of technology-enhanced creativity (McCormack, 2012, p. 56). In another paper, McCormack and d'Inverno reject the simplistic dichotomy between the trivial machine (/reproduction) and the true authentic artist (/emergence), noting for instance that some forms of automation can lead to artistic results that would not be achievable without them.[3] The generalisation of automation in creative practices raises new questions regarding the status of the automated artistic output. What amount of automation, one may ask, transforms an artistic output into a trivial output of the machine (McCormack & d'Inverno, 2012, p. 423)?

In addressing this question, McCormack contrasts "complexity automation" and "emergent complexity." "Complexity automation" refers to the simplification of complex functions to allow an easy use of technology at the cost of a loss of a higher level of user control (McCormack, 2012, p. 57).[4] McCormack mentions the example of digital cameras' presets where automation can, in some instances, nullify the artistic agency of the amateur photographer. This use of the camera is simplified, but this simplification can limit or normalise the aesthetic output. The physical virtuosity of the photographer using an analogue camera in manual mode and the material friction leading to happy accidents are lost. Moreover, in the context of automation as a trick to simplify the use of complex digital technologies, the presets are standardised, which can lead to a homogenisation of the output (as in the case of Instagram filters).

Against the risks of homogenisation entailed by the "complexity automation" paradigm, the "emergent complexity" paradigm privileges "interaction of well-designed components [to] generate […] new, higher-level functionality" (McCormack, 2012, p. 57). Against some form of digital Fordism in which vernacular creativity is thwarted by automation, is McCullough, who celebrates the virtuosity of the digital artisan using skilfully creative technologies (Broeckman, 2001; McCullough, 1996). In this case, the artistic agency of the human is increased.

A naive understanding of machines leads one to describe them as neutral tools enacting the intention of artists or creatives. Marshall McLuhan famously considered the media as an extension of human organs, but to extrapolate from this to a view of machines merely as the extension of human organs offers a limited understanding of their nature For Innis, this extension of human organs can lead to "the transformations of perceptual structures attendant upon technics, quite generally, and upon

[2] This relies on dream mechanisms, which seem to be specifically human, and which introduce a psychological space in which connections can be fluidly reconfigured at any time.

[3] This dichotomy would be limiting when considering the various forms of automation existing in the arts, from the practices of the surrealists to numerous contemporary arts practices.

[4] For instance, if the user disables all presets and switches to manual mode in digital photography, he would regain a higher level of control.

technology, particularly" (Innis, 1984, p. 70). This points towards a machinisation of the artist, and a situation in which machines cannot be considered a merely neutral tool anymore. Following this logic, the machines used to assist artists in their creation could be thought of as entangled with the intention and the incarnated actions of the human artist.

The philosopher of technology Gilbert Simondon introduced the concept of the technical individual to account for the complex relations between machines and their human operator (Barthélémy, 2009). This concept allows one to take into consideration the agency of machines, but also the agency of the human operators interacting with them. It presupposes that either (1) the machine, in its functioning, produces representations interpretable by the human operator, authorising a conscious manipulation of the machine by the human operator, or that (2) the human operator develops a kind of non-reflexive practical knowledge born out of the close manipulation of the machine, which Simondon designates as "minor knowledge" (Barthélémy & De Boever, 2012). In his writing on technics, Simondon always resorted to a humanistic conception of man-machine collaboration in which humans are aware of the agency of machines and they reflexively integrate it into their actions. Discussing automation in relation to Simondon, the philosopher of technology Yuk Hui notes:

> For Simondon, automation is the lowest level of perfection of machines (we understand here that by *automation*, he refers to the simple repetitive operation of machines); in contrast, automation must be problematized and the human must be reintegrated into the technical system (Hui, 2016, p. 215).

The reintegration of the human operator (to use Simondon's term) into the machinic arrangement is the purported goal of some software companies (such as Adobe Inc) that we will discuss at the end of this paper.[5] In the current context in which machine learning has become a pervasive technology, we must consider a new understanding of automation that goes beyond the "simple repetitive operation of machines." This will lead us to question the relevance of the reintegration of the human into the technical system.

[5] For instance, see how automation is marketed in the user guide of Adobe Sensei, an AI functionality added to several Adobe creative software and relying on machine learning: https://helpx.adobe.com/hk_en/photoshop/user-guide.html

3. Computational automation as an alien mode of thought or what it means for a computer "to think creatively" ?

Over the past years, Beatrice Fazi has been developing one of the most original reconceptualisations of computational technologies. Her work follows the theoretical claims of Luciana Parisi in her monograph on parametric architecture (Parisi, 2013) and includes in-depth analysis of the works of Alan Turing, Kurt Gödel, Georg Cantor, Alfred North Whitehead, and Henri Bergson. Fazi's notion of "contingent computation" addresses what appears after the fact as one of the most blatant blind spots of contemporary critics of computational technologies. With a few exceptions (Beer, 2020; Cecchetto, 2022; Fazi, 2021b; Stamm, 2020), her work has not yet generated extensive analysis and discussion in the fields of critical technology studies and in the philosophy of technology. In this paper, we will discuss one of her main contributions toward an original analysis of computational technologies: her critique of the anthropomorphisation of computational technologies, and how it fundamentally calls into question the popular simulation hypothesis according to which computational technologies are deemed to mainly emulate humans' actions and thought processes. Fazi wants

> to challenge the anthropomorphisation of computational technology in order to highlight that, when we apply phenomenological analogies to computational agents (so for instance, when we are saying that machines listen or read or think, or indeed they pay attention) we are implicitly projecting specifically human definitions of cognitive activities upon operations that are in fact, somewhat incommensurable with ours (Fazi, 2019, p. 95).

Fazi criticises the simulation theory born out of the work of Alan Turing.[6] According to Fazi (Fazi, 2018b), the simulation hypothesis posits that computers are deemed to capture the whole of human experience (what is termed in Fazi's book the meta-computational hypothesis). On the one hand, it promises too much (the entireness of human experience cannot be captured by the computer) and too little (as we will see, computers are capable of their own forms of emergence according to their computational logic). Fazi contends that computers have their own "order of intelligibility" that is not an emulation of the human thinking process.

[6] As a matter of fact, Fazi notes that despite this idea being attributed to Turing, Turing never envisioned the computer to be like a human.

For her, the computational world we live in requires us to sharply distinguish between augmentation and automation, two concepts that are often conflated when machines are considered as a pure extension of human's thoughts and actions. In a mechanistic view–for instance, the automation of production lines of automobiles developed by Henry Ford or the Jacquard loom, an example directly invoked by Fazi (Fazi, 2019, p. 97)–automation can easily be conflated with augmentation. The machines act as substitutes for the human body in order to perform a repetitive task more quickly, precisely, and efficiently. Nowadays, automation refers mostly to computational automation, "that is to say, a type of automation that is grounded on the algorithmic execution of rules and procedures via mechanised decision-making" (Fazi, 2019, p. 97). Fazi argues that:

> (…) automation in the twenty-first century must be understood in terms of the predominance of the computing machine, over all other machines. However, I am also stressing that computational systems, in the twenty-first century, have their own ontological and epistemological specificity: these computational machines, consequently, need to be examined in terms of technological alternatives to human cognitive capacities, and not as extensions or amplifications thereof (Fazi, 2019, p. 97).

If we acknowledge a radical discrepancy between "human and algorithmic 'thinking' operations," then we should have a full awareness of "the disparity between machines and life." We then have to recognise the distinct specificity of computational formalisation and its quantitative-logical character:

> This involves engaging with the epistemic contributions of computational formalisation by allowing automated modes of thought to operate independently of any aspirations towards replicating human cognitive faculties, and of the dimension of lived experience upon which these human cognitive faculties are ontologically predicated (Fazi, 2018a, p. 821).

Computational machines function on another "order of intelligibility" and they have their own "modes of thought" based on abstraction, discretisation, symbolism, and incomputable data, distinct from human cognitive and affective modes of thought; therefore, computational machines should not be anthropomorphised. After explaining how computational automation led her to sharply distinguish between the concept of augmentation and the concept of automation (i.e., machine automation cannot be thought of as "augmenting" pre-existing human modes of thoughts and logic of action), Fazi mobilises the concept of incommensurability taken from the field of the philosophy of science "to address explainability as a communicational and representational issue, which challenges phenomenological and existential modes of comparison between human and algorithmic 'thinking' operations" (Fazi, 2021a, p. 55).

Fazi distinguishes between situated computers and computers as computers. Situated computers are computers which are entangled with human life, plugged into human sense organs via sensors and digital analogue converters and registering human sense perception and behaviour. In this setting, automation is a process supplementing human creativity. In the case of computers as computers, computational technologies are creative when they yield specifically computational forms of emergence, that is, when their axioms hit a limit where a purely computational emergence (pure potential) occurs. Following Fazi, we might switch the inquiry from "can a computer think" to "can a computer have creative thinking"?[7] This then raises the question of what a computational mode of creativity would be.

4. Modes of computational emergences: For a new computational aesthetics

For Fazi, in contrast to the Deleuzian interpretation of emergence as linked to human affects, potentials, etc., the emergences computers are capable of are based on abstraction, discretisation, symbolism, and incomputable data. Fazi approaches the current issues with digital aesthetics by seeking to overcome a traditional opposition that constitutes a conceptual deadlock:

> (…) between the qualitative features that belong to the perceptual, sensuous receptivity that aesthetics cares for, and the quantitative modes of formal and logical organisation that computing instead relies on. This is an impasse that I describe as a deadlock between the continuity of sensation and of lived experience, on the one hand, and the discreteness of digital technologies, on the other(Fazi in Beer, 2020, p. 292).

Fazi considers aesthetics as a theory of sensory knowledge, and is both informed by and critical of the aesthetic ontology of Deleuze, "as openly metaphysical inquiries into the possibility of the new"

[7] In her own terms: "can a machine think (anything new)?" (Fazi, 2018a).

(Fazi in Beer, 2020, p. 292). For Deleuze, inspired by the reading of Bergson, aesthetics concerns physical reception and bodily transduction, invoking notions of affect, the analogue, the continuous, the virtual as indeterminacy, and the immanence of thought and sensation. She adds: "In Deleuze's work, thought is aesthetic because it concerns a virtual abstractness that can only be felt metaphysically" (Fazi, 2018b, p. 12). For Deleuze, computational technologies, given their discrete nature, cannot offer the possibility of the new.[8]

Fazi rejects Deleuze's contention that computational technologies could not lead to forms of emergence (or, cannot think anything new) because of their discreteness. She uses Whitehead's concepts of prehension and potential to explore what constitute modes of emergence for computational technologies. Whitehead's processual philosophy allows Fazi to develop an aesthetic analysis of the computational. She can then extend the aesthetic ontology of Deleuze (as metaphysical inquiry into the possibility of the new) to computational technologies. Fazi contends that Whitehead's aesthetics operates at two levels. Here, we are integrating an extensive series of her quotes because this point is central in her argumentation:

> For [Whitehead], aesthetics is not only about a bodily transduction and a physical reception, or about the thought that comes from sensibility. Instead, aesthetics is about mental processes too. In Whitehead's philosophy, this mental activity pertains to actuality. It is aesthetic because it is not a representational reduction or mediation but a conceptual prehension: it is a grasping, seizing, or holding of the pure potentiality of an ideal. This characteristic of Whitehead's ontology (…) affords a means of advancing an aesthetic ontology of computation that would not discard the logico-quantitative operations of computational systems expressed through formal abstraction, but which would instead interpret such formal abstraction through Whitehead's description of conceptual prehensions. By constructing a computational aesthetics at two levels, it will become possible to show, against the cognitivism that prevails in the computing field, that computation is not just a mere method of reduction via a priori representation. However, it will also become possible to rethink the undeniable abstractive capacity of computation in a manner that goes beyond the representational but remains within the formal and the quantitative (Fazi, 2018b, p. 12);[9]

and,

> Whitehead did not restrict his investigation of experience to human conscious experience, nor did he limit a capacity for experiencing to that which is strictly alive. (…) [I]n a manner that contrasts with Deleuze, Whitehead's notion of experience does not suggest any existential connotation, related to what is lived, nor is it circumscribed to the sensible either (…) (Fazi, 2018b, p. 13);

and

> for Whitehead, all actuality experiences because experience, in his philosophy, is equivalent to the process of self-determination of actuality. (…) I follow Whitehead's characterisation of experience as self-actualisation to argue that computation's own experience can be understood to correspond to computation's own process of self-determination. However, if one wants to establish the extent to which computation's activity of self-determination can be understood as the experience of computation itself, the conditions of such self-determination need to be investigated, together with the degree to which they can be understood as those of computation's experience. Reciprocally, if such experience corresponds to an ontological operation of determination (specifically, that of computation), then the conditions of that experience are also those that allow this operation of determination(Fazi, 2018b, p. 14).

It follows that given that the operation of determination of computational technologies are (as seen before) linked to a specific order of intelligibility pertaining to abstraction, discretisation, symbolism,

[8] This theoretical stance has been developed in multiple ways through the affective turn in the humanities (Clough & Halley, 2007). Fazi states: "According to an affective approach, abstract indeterminacy can only be felt: this is the indeterminacy of Deleuze's virtual. In my work, however, I resist such a virtualisation of computation because virtualising the digital involves sidestepping the logico-quantitative specificity of computational systems" (Fazi in Beer, 2020,p.293).

[9] "Whitehead opted for the term 'prehension' in order to distance himself from any psychological and anthropocentric understanding of what, for him, it meant 'to feel'. 'To prehend' is not 'to cognise', but neither is it 'to perceive'. A prehension should instead be conceived as an 'uncognitive apprehension'—that is, a grasping, a seizing, or the holding of one thing by another thing" (Fazi, 2018b, p. 63).

and incomputable data, an aesthetic ontology of the computational must account for the possibility of the new within this specific alien, non-human computational order of intelligibility: “the reliance of computational systems on pre-programmed rules does not prevent, but in fact enables, the generation of novelty” (Beer, 2020, p. 304).

Further Fazi explains that she “develops the unexplored hypothesis of a computation that experiences by arguing that this experiencing is tied to quantitative processes that are not expressions of virtual sensibility but are in fact the actual and yet formal operations of computation itself” (Fazi, 2018b, p. 13).

As previously noted, Fazi rejects the concept of the virtual heavily used by Deleuze after Bergson because this concept is tied to a specifically human order of intelligibility (indeterminacy and immanence of thought and sensation). For that reason, the concept of potential as developed by Whitehead is a precious resource to expand her analysis of computational forms of emergence. The table below summarises the concepts of Whitehead as invoked by Fazi:

Actuality determining itself (as decision amid potentiality through prehensive activity leading to the constitution of an actual occasion)	Physical Prehension (turn past actual occasions into data participating in the constitution of a future actual occasion–data are abstracted from the immediate experience)	Real Potentiality (computational actual occasions)	Computational process (has internal real and pure potential for self-actualisation leading to a computational actual occasion which has an end, both in terms of aim and completion)
	Conceptual Prehension of pure indeterminacy of unknown idealities (‘eternal objects’)	Pure Potentiality (of the uncomputable–evaluation of a pure possibility)	

Figure 1. (Based on Fazi in Beer, 2020, pp. 303–304)

The computational actual occasions are real computational processes that take place in conjunction with the pure potentiality of uncomputable data. Together, they are to be ‘prehended’ into a computational actual occasion. For Whitehead, actual occasions “are the final real things of which the world is made up. There is no going behind actual entities to find anything more real. (...) The final facts are, all alike, actual entities; and these actual entities are drops of experience, complex and interdependent” (Whitehead, 1978).

This process of constitution of the computational occasion establishes “that the ontological character of computation is not wholly predicated on quantitatively discrete elements” (Stamm, 2020). Drawing from her commentary of Gödel and Turing, Fazi asserts that the uncomputable is at the core of the constitution of a computational process. The concepts of real and pure potentiality allow Fazi to propose a new computational ontology that is at the heart of her book, *Contingent Computation*. Computation appears as a ‘fact with no thought,’ a kind of computational empiricism which “demotes experience to a collection of empty facts in search of an external principle of interpretation, thus situating the mental valuation of this factuality outside of the constitution of the fact itself” (Beer, 2020, p. 304).

It follows that when we evaluate the computational process, we must reject both (1) the a-perspectival positivist evaluation of it (the data would speak for themselves) and (2) the reductionist critiques of algorithmic rationality that reduce the logico-quantitative specificity of the computational process to pre-existing cognitive or critical interpretations of the computational process as discrete and alienating (Beer, 2020, p. 305).[10] The concept of prehension (which is not a cognitive apprehension but more a grasping) and the concept of uncomputable data disqualify any analysis in terms of a pre-existing interpretative framework, giving way to a new form of computational empiricism. Fazi specifies how computational processes should be evaluated:

> Determining the role of factuality in relation to the actuality of computation is thus part of my speculative effort to rethink the limits of computation alongside its potentiality. The Whiteheadian analysis of the interrelation of facts and forms is crucial precisely when considering such a potentiality. By ‘forms’ here I do not mean the a priori transcendent entities of computational idealism. Forms, in my proposed philosophy of computational actuality, are rather ‘forms of process’: again, this has to be interpreted in a Whiteheadian sense, which highlights the internal constitution of actuality via a conceptual labour with the indeterminate, thus pointing to a structure of actualisa-

[10] The reductionist critiques of algorithmic rationality refer here to critical cognitive or cognitive-capitalist approaches (Beer, 2020, p. 305).

> tion that is specific to the process of determination itself (Beer, 2020, p. 305).

If human creativity can be explained by the frictions of the creative agent with the real– with their cultural situatedness–then computer creativity (computers thinking something new) can be evaluated through the frictions that arise in the (selective) prehension of data and in the ingression of unknown idealities (the uncomputable which is at the heart of computational processes).

5. Creative software as 'soft thought': Implications of Fazi's work for the evaluation of computational forms of creativity in digital creative practices

To conclude we want to outline how Fazi's work is connected to the study of a specific kind of computational technology: digital creative software used by artists or creatives to produce music, movies, video games, visuals, pictures, and drawings.

The simulation paradigm postulates that machines could replace humans, i.e., machines would comprehensively simulate the vagaries of human creative behaviour and thought. One form taken by this simulation paradigm in the field of computational creativity is the implementation of machine learning in a growing array of creative software (Johnson, 2017). These new AI technologies fuel growing anxieties about the replacement of creatives and artists by machines (the computational "capture" of the human creative act). Following this critical stance, creative acts (understood as processes embedded in the mundane) are captured by software that design the creative experience as a pervasive form of consumption. Creative analogue emergences appear at risk given the anxiety that the lifeworld of artists could be colonised by commodified creative technologies automating an increasing variety of creative tasks.

Creatives and artists, through their use of creative software, produce data which are then processed through machine learning. To an extent, the artificial intelligence integrated into the creative software 'learn' from the ways in which they are used by human operators. But we should refrain from thinking that machine learning algorithms can reproduce the human creative act. To do so would be to subscribe to the 'fallacy of misplaced concreteness,' which Whitehead cautions against. Following Fazi, we can formulate two objections to the purported capture of the human creative act by creative software:

- First, the data used by creative software are not the actual human creative act in its totality, "but only quantifiable records of it," or "an abstraction from the immediacy of experience" (Beer, 2020, pp. 303-304).[11]
- Second, the actual process of constituting a computational actual occasion involves past computational actual occasions (real potential) but also the uncomputable as the evaluation of a pure possibility. The uncomputable derails any simulation or reproduction of the indexical human creative act, and yet is an essential component of the computational actual occasion resulting from the monitoring of human use of creative software by machine learning technologies.

In relation to this, we want to highlight a paradox: machine learning technologies are very good at approximating human forms of reasoning based on multiple fuzzy data; prima facie we might want to say that machine learning enables digital technologies to emulate human forms of thinking (i.e. to emulate the creativity of humans using these software). Yet, as pointed out by Fazi, this form of algorithmic processing is blackboxed:

> Because they are modelled to act as deep neural nets, these techniques are often very opaque, or indeed illegible, because they are so complex that they cannot even be understood by the programmers that created them. Machine learning works, but we do not fully understand how (Fazi, 2018a, p. 822).

Fazi contends that machine learning is a crack in the simulation paradigm. According to the simulation paradigm, machines are supposed to imitate the way humans think. But in the case of machine learning, algorithms process fuzzy information according to their own logic, and we cannot really represent it to ourselves or understand what they are doing–that is, we cannot understand how they "think." But it is precisely because we cannot understand what is going on (for instance, inside neural networks) that machine processes could never replace the human creative act. We cannot understand these processes because the machine operates at a different order of intelligibility than humans. Hence, any anxieties about machines replacing humans are a symptom of

[11] Nick Cave recently wrote an answer to a fan who wrote a "Nick Cave" song using Chat GPT, an AI tool to write songs: "Songs arise out of suffering, by which I mean they are predicated upon the complex, internal human struggle of creation and, well, as far as I know, algorithms don't feel. Data doesn't suffer." https://www.theredhandfiles.com/chat-gpt-what-do-you-think/

the failure to recognise how computational machines operate in their own right.

Rather than succumbing to a general misplaced anxiety about computational machines replacing humans once and for all, we should, following Fazi, embrace the necessity of considering the “alien thought” of algorithmic processes (Fazi, 2018a). In our view, artists or creatives using creative software are already aware that these computational technologies belong to a different order of intelligibility. There are multiple forms of digital creativity that are deeply intertwined with the unique ways in which digital technology operates. For instance, algorithmic art, generative art, system art, or cybernetic art are predicated upon the specificities of digital and computing technologies. Rather than seeking to anthropomorphise these digital technologies, artists use them on their own terms. They accept the different order of intelligibility of computational creative technologies, taking into account their computational potential for emergence when using them to create.

The combined conclusions that there is no raw data (Beer, 2020, pp. 303-304) and that the simulation paradigm is at best an illusion has led us to contextualise contemporary anxieties surrounding the use of computational-assisted forms of creation. These conclusions also encourage critical theorists of new media and digital creatives and digital artists to fully evaluate the different order of intelligibility under which their creative software operate.

References

Barthélémy J-H (2009) Gilbert Simondon, imagination et invention (1965-1966). *Documents pour l'histoire des techniques. Nouvelle série,* (17), 230–231. Retrieved from http://dht.revues.org/580

Barthélémy J-H (2012) Glossary: Fifty key terms in the works of Gilbert Simondon. In *Gilbert Simondon. Being and technology*, eds A. De Boever, A. Murray, J. Roffe, & A. Woodward, 203–231. Edinburgh University Press.

Beer D (2020) Explorations in the indeterminacy of computation: An interview with M. Beatrice Fazi. *Theory, Culture & Society,* 38(7–8): 289–308. doi:10.1177/0263276420957054

Broeckman A (2001) Abstracting craft: The practiced digital hand (review). *Leonardo*, 34(1): 78-79. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1460

Cecchetto D (2022) *My computer was a computer: Catalyst: M. Beatrice Fazi*. Victoria: Noxious Sector Press.

Clough P T, Halley J O M (2007) *The affective turn: Theorizing the social*. Durham, NC: Duke University Press.

Fazi M B (2018a). Can a machine think (anything new)? Automation beyond simulation. *Ai & Society,* 34(4): 813–824. doi:10.1007/s00146-018-0821-0

Fazi M B (2018b). *Contingent computation: Abstraction, experience, and indeterminacy in computational aesthetics*. London; New York: Rowman & Littlefield International.

Fazi M B (2019) Distraction Machines? Augmentation, automation and attention in a computational age. *New Formations,* 98: 85–100. doi:10.3898/NEWF:98.06.2019

Fazi M B (2021a) Beyond human: Deep learning, explainability and representation. Theory, Culture and Society, 38(7–8): 55–77.

Fazi M B (2021b). Introduction: Algorithmic thought. *Theory Culture & Society,* 38(7–8): 5–11. Retrieved from http://sro.sussex.ac.uk/id/eprint/103619/1/02632764211054122.pdf

Hui Y (2016) *On the existence of digital objects*. Minneapolis: Univ Of Minnesota Press.

Innis R E (1984) Technics and the bias of perception. *Philosophy and Social Criticism*, 10(1): 67–89.

Johnson K (2017, March 17). How Adobe used its huge data bank to build Sensei, an AI tool for creatives. *Venture Beat*. Retrieved from https://venturebeat.com/ai/how-adobe-used-its-huge-data-bank-to-build-sensei-an-ai-tool-for-creatives/

McCormack J (2012) Creative ecosystems. In *Computers and creativity*, eds J. McCormack & M. d'Inverno, 39–60. Berlin, Heidelberg: Springer Berlin Heidelberg.

McCormack J, d'Inverno M (2012) Computers and creativity: The road ahead. . In *Computers and creativity*, eds J. McCormack & M. d'Inverno,421–424. Berlin, Heidelberg: Springer Berlin Heidelberg.

McCullough M (1996) *Abstracting Craft: The practiced digital hand*: The MIT Press.

Nakamura K, Gunji Y P (2020) Entanglement of art coefficient, or creativity. *Foundations of Science, 25*(1), pp. 247-257. doi:10.1007/s10699-019-09586-8

Parisi L (2013). *Contagious architecture: For an aesthetic computation of space*. Cambridge, Massachusetts: The MIT Press.

Stamm E (2020) Anomalous forms in computer music. *M/C Journal*, 23(5), doi:10.5204/mcj.1682

CLASHES OF TEMPORALITY IN AI AND ARTISTIC CREATIVITY

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Abstract:
Art creates a specific relation to time and especially to the present moment. It opens the experience of the present towards its indeterminacy and emergence. On the contrary, AI does not know the present. It recognizes only the past and future. We could even say that artificial neural networks do not "know" time at all. Instead, they know only logical functions which process patterns of information. Yet, what makes time "time" is genuine transformation, which happens outside of the abstract realm of logic. I support these observations by analysing two works of art: Bill Viola's *The Raft* (2004) and Hito Steyerl's *This Is the Future* (2019). While artistic creation opens up the intervals "in-between seconds" for an unpredictable and transformative event to occur (*The Raft*), AI closes these intervals and fastens the future into predictability calculated on the basis of past data (*This Is the Future*). Although this machinic operation makes the present even more unpredictable and prone to catastrophes, its potential for transformation seems to be withdrawn.

Key words: Hito Steyerl, Bill Viola, Bergson, Yuk Hui, predictive algorithms, event.

Present time dynamics in AI

Hito Steyerl's *This Is the Future* (2019) is an immersive multichannel audiovisual installation presented for the first time at the Venice Art Biennale 2019. It intertwines multiple voices, lucid AI-generated images of vibrant flowers and Venice-like cityscapes, poetic speculations, and dreamy chanting. The floor of the exhibition room is covered with olivine pebbles, which are able to trap carbon dioxide. The visitors are encouraged to take a piece with them and learn more about its properties.

Immersed among the screens we hear the imaginary story of Heja (narrated in Kurdish by musician Hêja Netirk). Accumulating implicit and fragmented clues (Kurdish voiceover, narrated stories, video fragment of far-right nationalist protest in Germany), we begin to understand that the main protagonist is a Kurdish immigrant in Germany, who has suffered political repression by an authoritarian regime and who dreams about freedom and democracy. Heja's reflections are intermingled with the divinatory musings of a preemptive neural network in its attempts at predicting Heja's future.

Let's hear what Heja recounts:

When we were in jail, we grew plants by crumpling paper and chewing it. We caught flying seeds in the courtyard and got them to germinate on the paper. The flowers grew on love letters and indictment charges for centuries of detention. The guards would come and destroy the plants whenever they found them. *So we hid them in the future, where the* *network predicted we could retrieve them soon. But as the future was predicted, the present became unpredictable (Steyerl, 2019).*[1]

What follows is a 30-second video of a far-right nationalist protest in Germany.: "Germany to Germans, foreigners out." (Steyerl, 2019)

We also learn what kind of "power flowers" the prisoners wanted to grow:

> *Hordeum murinum* (images of AI-generated glossy pink blossoms): "Whoever has a sick brain from social media addiction can pulverize this plant and mix it with silver, thus making a paste"(Steyerl, 2019).
>
> *Sisymbrium altissimum* (pastel pink blossoms): "Its chemistry attaches to political endorphin receptors in the brain, thus making it unsusceptible to hate speech and austerity propaganda" (Steyerl, 2019).
>
> *Malva neglecta* (radiant fiery blossoms): "It augments greening power by capturing sunlight and spending it for delight. Use the CO2 extract to poison your local autocrat" (Steyerl, 2019).
>
> *Artemisia vulgaris* (pink blossoms): "This plant is a stunner. It doesn't do anything; just do the same and you will feel much better" (Steyerl, 2019).
>
> *Rosebay willow*, also called *Palmweed* (pink blossoms): "This plant produces oxygen and sequesters CO2. This superpower is shared by almost every other plant on the planet" (Steyerl, 2019).

The second protagonist is a neural network capable of predicting the future. "This is the immediate future. I am a neural network. This is what I see. *I can see one fraction of a second into the future.* My predictions are based on extreme probabilities" (Steyerl, 2019). More particularly, this neural network is a random forest algorithm trained

> to predict the growth of a single bamboo shoot. But then it didn't stop. Soon someone realized one could use it to predict traffic, rebellion and suicides. A random forest is a very popular prediction algorithm. In this forest, science comes to die and is reborn as alchemy. Prediction takes the place of production. Your future has been written in the past and it will always catch up with you (Steyerl, 2019).

The network advises Heja to hide her garden in the future; to accept her inability to transform her present situation and direct her attention and power toward the future: "Come back to tomorrow and hope for the best." However, complains Heja, the future proposed by the network is a bad repetition of the past. It looks like "in this future wealth trickles down, power comes from Fukushima and technology is rational." The network is stuck. "It thinks it can predict the future using old data. It brags on and then just keeps repeating itself" (Steyerl, 2019).

As a result of this folding of the future over the past, "distance between seconds grows closer" and Heja must enter "into the future by slipping into the cracks in between seconds".Finally, Heja takes the matter into her own hands and makes her own prediction:

"Let me make a prediction. None of this will ever happen. I will never enter the future to look for my garden. Because it is already here. Because whatever future will be: It always starts here and now. This is all I can say'" (Steyerl, 2019).

Overall, This Is the Future is an artwork about our collective imagination and our willingness to outsource our projection into the future to artificial intelligence. Can a neural network predict the future? And what does prediction actually mean? "Future prediction is an old problem. People have tried to predict the future for thousands of years" (Steyerl, 2019). Anticipating upcoming events allows people to prepare for natural calamities and gain some control over the risks the future could bring. Prediction, therefore, as most commonly understood, is a conscious and grounded attempt to determine, in advance, the nature of future events on the basis of what is already known and in service of deliberate intentions and plans.

Drawing on recent experimental research in neuroscience and computational modelling, analytical philosopher and cognitive scientist Andy Clark (2016) argues that prediction is the fundamental principle of cognition. In this light, he defines the human brain as a "prediction machine." However, the kind of predictions he discusses are not the familiar anticipations of near-future risks and opportunities. What he has in mind is "automatically deployed, deeply probabilistic, non-conscious guessing that occurs as part of the complex neural processing routines that underpin and unify perception and action" (Clark, 2016, p. 2). According to this model,

[1] All emphasis in the text from *This Is the Future* is added by me - NI

perception is not a passive process of receiving and encoding the sensory signals bombarding our sensory organs from the outside world. On the contrary, it is a proactive anticipation, at multiple temporal and spatial scales, of the shape that sensory data will take in the ensuing moment of time. This anticipation is rooted in a general model of the world, namely, in the systemic knowledge built through past experience. In this process, the incoming sensory signal plays the role of fine-tuning the prediction. "Such brains are incessantly pro-active, restlessly seeking to generate the sensory data for themselves using the incoming signal (in a surprising inversion of much traditional wisdom) mostly as a means of checking and correcting their best top-down guessing" (Clark, 2016, p. 3). This means that the mind does not receive the full data from an object (red, round, hard, shiny, etc.) and then make an idea of that object as a whole (an apple), but rather generates the sensory signals anticipating these data in advance.

This mechanism is reminiscent of the dynamic of primary protention and primary retention in Husserl's famous example of the unfolding melody. However, the point here is not only the thickness of the now, but also the fact that the incoming sensory signal serves mainly to check if these expectations are correct and to fine-tune them, rather than to inform the perception of the full range of sensory data accessible to our sensory organs. Indeed: "If the predictive processing story is on track, then perception is indeed a process in which we (or rather, various parts of our brains) try to guess what is out there, using the incoming signal more as a means of tuning and nuancing the guessing rather than as a rich (and bandwidth-costly) encoding of the state of the world" (Clark, 2016, p. 27). We build a generative model of the world and expect the integrative parts of it to behave in a certain way. Regardless of how dynamic our model is, our expectations ignore certain sensory stimulations at the expense of others. The stimulations that are registered by the perceptual organs are already structured in a top-down manner by the generative model outlining the boundaries in which the incoming stimulations will be interpreted and integrated into the whole.

The indispensable element in this structure of cognition is action. The expectations that generate the anticipated sensory signals cause bodily movements that selectively harvest new sensory stimulations; "perception and action are thus locked in a kind of endless circular embrace" (Clark, 2016, p. 7). What we do depends upon what we perceive, and what we perceive is constantly conditioned by what we do. This results in a form of circular causality, reinforcing the optimisation of perception and action. Multi-layered predictions entrain actions that both test and confirm these expectations and help mould the sensory streams that recruit new predictions "in a rolling cycle of expectation, sensory stimulation, and action" (Clark, 2016, p. 176). Moreover, the brain aims at alleviating the load of its own inner processing, selecting optimised, efficient routines that rely on minimal action and habitual environmental context so as to reduce the demands on neural processing and to preserve the energy necessary for costly computation. Ultimately, the goal of this model of cognition is to deliver "fast, fluent forms of adaptive success" (Clark, 2016, p. 1) in order to reduce disorientation and unpredictability as much as possible, and to preserve the intellectual and energy resources of the brain and the body.

To summarise: we don't just passively receive sensory information about the phenomena around us; rather, we actively apprehend these data and build our concepts and models of how the universe operates. According to the predictive brain framework, perception is : 1) selective; 2) future-driven (we see mostly what we already expect); 3) past-dependent (we expect only what we already know exists as part of our model of the world; our memories and beliefs outline the boundaries of what we expect, and consequently, perceive); 4) action-bound (it is through action that we select certain stimuli and ignore others); and, 5) reductive (we ignore those stimuli which are irrelevant to our survival or personal goals in order to save energy and processing power).All these points underline the "surprising extent to which the structure of our expectations (both conscious and non-conscious) may be determining much of what we see, hear, and feel" (Clark, 2016, p. 28). Indeed, our expectations are structured to isolate that part of reality as a whole that interests us. We pay less attention to the things themselves than to the use we can make of them.

This model closely corresponds to a similar one called the Bayesian brain hypothesis (Clark, 2016, p. 8). The Bayesian hypothesis considers the brain as a statistical organ of hierarchical inference that predicts current and future events on the basis of past experience. According to this theory, the mind makes sense of the world by assigning probabilities to hypotheses that best explain (usually incomplete and ambiguous) sensory data, and continually updating these hypotheses according to standard probabilistic rules of inference. This optimisation of perception and action operates under the single imperative of minimising surprise and uncertainty.

Various statistical methods (including Bayesian inference) are implemented in machine learning algorithms to render them capable of predicting future probabilities (see Domingos, 2015). From guessing the next letter in a word based on the previous letter(s) (Google auto-complete), the next word in a sentence based on the previous word(s) (Google Translate and text-generators such as GPT-3), and the next image frame in a video based on the previous frame(s) (random forest algorithm used in This Is the Future) to predicting stock exchange rates (HFT algorithms) or customer preferences (Amazon suggestions algorithms), preemptive neural networks are ubiquitous in the world of artificial intelligence. Their algorithmic logos transforms every bit of analogous data, energy, or matter into computable streams of digits, just as King Midas transformed everyone he touched into gold, killing them in the process. Human attention, choices, emotions, desires, weaknesses, preferences, bodily gestures, movements, and kinetic energy get captured by algorithms and turned into streams of numerical data to be used by neural networks for preemptively directing human attention and suggesting future choices, preferences, and gestures. This "form of anticipation that is no longer my own subjective projection but rather a projection that is imposed on me and proceeds ahead of me" (Hui, 2021, p. 80), which is orchestrated by technological automation, is what philosopher Yuk Hui has termed "tertiary retention." The existential time of each individual is fragmented and reorganised so that it becomes computable in the form of automatic predictions through which behaviour gets oriented (Hui, 2021, p. 81). Performed at a global scale, it forecloses humanity's collective imagination regarding the future and substitutes it with a mechanical and homogeneous projection which is based on reorganisation of past patterns of behaviour. Automatic imagination presents the collective future of humanity as a single time axis of technological progress spanning the globe and heading toward transhumanist singularity, a future that will inevitably "arrive at us" (Hui, 2021, pp. 82-83). Bernard Stiegler also warns of the dangers of adapting to such a passive becoming (devenir), which leads to entropy, and contrasts it to an incalculable future (avenir) that is open to genuine transformation and differentiation, and which we adopt by actively projecting ourselves forward (Stiegler, 2015).

At this point, I would like to refocus our attention from the dimension of the future to the question of the present. When preemptive computational mechanisms are mobilised in the prediction of future probabilities, what happens to the infinitesimal fleeting instant we call the now?

There are two perspectives from which we could approach the question. The first is the organological perspective (machine-human cognitive assemblage) in which the microtemporality of computation influences human affects and attitudes at a level below the 100-millisecond threshold where perception and sensation register for humans (Hayles, 2017, p. 173), thus serving as a "technological unconscious" (Thrift, 2008, p. 91) operating in the background of human awareness. "These media operate so quickly and pervasively that they intervene in the ground from which prehensions arise. They thus precede the cognitive timeline while also decisively influencing the kinds of sensations and perceptions that are possible and relevant within a given milieu" (Hayles, 2017, p. 173).

The second perspective is to question how neural networks relate to the present as part of a machine-machine cognitive assemblage, which executes computational time independently of human intervention. The extreme example of high-frequency trading algorithms (HFT) discussed at length by Katherine Hayles (2017, Ch. 6) would provide a good illustration. HFT is an electronic form of financial trading executed by algorithms. Faster processor speeds, vast increases in computer memory, and fibre optic cables through which information travels at near-light speeds have accelerated the stock exchange to the point that human traders are excluded from the process and replaced by "duelling" algorithms. The algorithms search for patterns that will enable them to predict the next micromovement of stock prices and the orders that rival algorithms may be about to execute. While competing with other algorithms they evolve and learn (Hayles, 2017, p. 172). Algorithmic analysis and prediction happen at ultrafast speeds, such as 129 microseconds (a little more than a tenth of a millisecond), which has led to a change of the temporal regimes within which the market works (Hayles, 2017, p. 165). The speed is too fast for human traders to monitor each transaction. The pressure for speed becomes the main value for the effective performance and evolution of the algorithms. As a result, they must sacrifice multiplicity of inputs for speed and reduce the range of strategies from which to choose. Many algorithms also have very similar strategies, generating feedback loops that lead to even greater homogenisation.

This leads to catastrophic failures, such as the financial crisis of 2008, or the more innocent example of a book on Amazon, which at a certain point reached the absurd price of 24 million US dollars (Hayles, 2017, pp. 155-6). As Hui has pointed out, “algorithmic catastrophe doesn’t refer to material failure, but rather to the failure of reason” (2015, p. 123). In its aim to control the unpredictability of the future, technology generates its own accidents. These accidents are internal to the system and are “repetitive arrivals of catastrophe without apocalypse” (Hui, 2015, p. 124). Apocalypse in this context means a new beginning, a potential for transformation, which, in the case of algorithmic catastrophes, is suspended as a possibility. As the catastrophic event comes from the internal operation of the algorithmic systems and not from outside, it reinforces the totalising tendency and does not provide any alternative outside of the technological system. This incapacity for genuine transformation means that the computational mind is repetitive and timeless since its temporality is constructed of purely logical operations (Hui, 2016, p. 234). Locked between the prediction of patterns and ultrafast actions, it shrinks the duration of the present to almost non-existent, making the algorithmic systems blind to the world beyond their own systemic operations. In the case of HFT, the profits the algorithms generate are purely speculative and contribute only to making money for the companies that employ them, without supporting the diversity and fairness of the market itself. As the percentage of trades executed by HFT algorithms continues to increase, the result is that the market ecology moves more and more into speculation and less into synergistic interactions with the real economy, resulting in what Hayles names “vampiric capitalism” (Hayles, 2017, p. 159).

The conclusions we can infer in relation to the computational now are as follows: the present instant is reduced to non-existent, squeezed between algorithmic prediction and execution, which are locked into an ultrafast recursive loop. Speed is taken as absolute value at the expense of richness of data input and predictive strategies. As a result, preemptive algorithms reduce the full scope of the gestures, phenomena, or events they aim to control to abstracted functions on which speculations, devoid of direct reference to reality outside of the symbolic order of computation, are built. The consequences of this operation are that, “as the future was predicted, the present became unpredictable” (Steyerl, 2019) and prone to catastrophic events. The unpredictability of the computational now is a type of catastrophe that does not lead to transformation. It is not creative. Rather, algorithmic prediction leads to more of the same. It generates an illusion of difference in the form of possible choices, but never genuine novelty, evoking Heja’s complaint that the future proposed by the network is merely a bad repetition of the past–it is just like “the future looked in the twentieth century. In this future wealth trickles down, power comes from Fukushima, and technology is rational” (Steyerl, 2019). The network is stuck. “It thinks it can predict the future using old data. It brags on and then just keeps repeating itself” (Steyerl, 2019).

Present time dynamics in art

Bill Viola, *The Raft* (2004)

In an indeterminate public space, possibly a bus station, a group of 19 urban dwellers from all walks of life gradually gather in line and begin to wait. They arrive one after another, moving through space in such extremely slow motion that their advancing into position is almost imperceptible. Regardless of the imposed physical proximity, once arrived, they halt into stillness, ignoring the rest. Some begin to read, others stare in front of their feet, absorbed in thought or overwhelmed with boredom. Their disregard for each other is almost palpable, emphasising the conspicuous variations of their appearance in terms of ethnicity, class, age, race, gender, and culture. It is a group of individuals with incompatible life trajectories, who momentarily meet due only to the nature of this transitional space and time.

Suddenly, something entirely unexpected happens. Without warning, torrents of water flood the space from all sides. Some of them struggle to resist the formidable rage of the current, others grab hold of each other, while a third are knocked to the ground. All bodies disappear into the impenetrable mist. Immersed in front of a life-sized high-definition screen and surrounded by five channels of sound, one cannot but feel the shock of the impact, the pressure and uproar of the current, the vulnerability of the human physique. For a brief moment, all individuals seem to merge into an undifferentiated mass of entangled bodies. Eventually, the water recedes. In the aftermath of the deluge, the victims embrace and console each other, making sure to help those who have fallen. They gradually regain their composure, but the dynamic of the group is never the same again.

As with most of Viola's ultra slow-motion pieces, *The Raft* is a reference to a classical painting– Théodore Géricault's *The Raft of the Medusa* (1818-19), a monumental depiction of a group of people struggling to survive a shipwreck on a makeshift raft. Under Viola's touch, the disturbingly expressive Romantic painting is metamorphosed into a rather meditative piece. Shot at 300 frames per second (instead of the usual 25 fps), the acted situation in *The Raft* takes only a couple of minutes in real time but is played back for over ten minutes without any loss of resolution. The effect is a rupture of perception from expectation. It is the interval that occurs in-between moments, stretched to almost intolerable length, that takes hold of the attention. This interval is not the infinitely divisible interval of mathematics expressed most eloquently in the Zeno paradoxes. It is an interval with a quality, not a quantity; an interval that is capable of modifying the attention into a deeply perceptive, attentive, and patient act of focused awareness unabridged by practical interest.

As a result, the habitual loop between expectation and action characteristic of the predictive mind is torn apart and what shines through is the full perceptual richness of sensations and affects as they get access to the senses without the shield interposed by anticipation. The effect of such expansion of the now is that one becomes capable of perceiving the act of perception itself. What formerly was non-existent becomes an intense existence. Each insignificant gesture or facial expression attracts attention and becomes loaded with meaning. The presence of each figure carries noticeable intensity. The interval between moments is neither past nor future; it makes us present to the becoming of the present. The micromovements of becoming usually inaccessible to conscious awareness become the focus of attention and pass the threshold of conscious perception. What becomes visible is not so much the action or the story, but the emergence of time itself. One is reminded of the fact that the nature of time is change and indeterminacy, a "perpetual creation of possibility and not only of reality" (Bergson, 1992, p. 17).

And then the disaster strikes. The event of the disaster, however, is of a different kind than the algorithmic catastrophe. Unlike the accidents of technological systems, which are internal to their operation, the unexpected flood in *The Raft* is not the result of the actions and passions of the bodies and their interaction in the assemblage. As a natural disaster, its unpredictability extends beyond measure or calculation: "the contingency of the laws of nature always comes from outside, meaning that the system cannot be totalized" (Hui, 2015, p. 131). It is an event which creates a rupture between the previous state of the system and the state that follows. Such an event extracts from a moment of time the possibility of another time. This other time, whose materiality envelops the consequences of the event, deserves the name of a new present. Such an event is at the same time a rupture and a connection. It is not what takes place 'between' a past and a future, between the end of a world and the beginning of another: it realises the indivisible continuity of what Bergson calls *duration*. It exposes the unity of becoming, which merges the past, present, and future into the now. When the accident strikes from outside of the system, it is apocalyptic, that is, it creates an opportunity for a new beginning that was non-existent before the event. "It may be worth noting that the ancients, in times of catastrophes such as drought or flood, placed their hope in the restoration of the cosmic order, an order that would triumph over all contingencies" (Hui, 2015, p. 125). A similar restoration of the order between humanity and the cosmos is what we observe in *The Raft* after the victims recover from the calamity. The individuals in the group restore their authenticity and reconnect to the moral laws that make humanity humane.

The group is transformed from a quantitative to a qualitative multiplicity if we are permitted to adopt the terminology of Henri Bergson. A quantitative multiplicity enumerates identical units by means of externalising one from another in a homogeneous space. In this case, the people waiting at the unidentifiable generic space are separate from each other despite their physical proximity. As a group they generate an aggregate of individual bodies that can be juxtaposed as each of them occupies a discernible location in space. In appearance they are diverse, but their behaviour demonstrating mutual indifference makes them psychologically identical. They are just shadows of selves projected into space (Bergson, 2001, p. 137) and the space itself is just an empty homogeneous container without personal character. These people do not experience duration as a dynamic assemblage. They are situated in an endless repetitive present in which they wait for something to happen (e.g., a bus to arrive). With no past or future, the multiplicity they form as a group knows no real movement or change (*durée*) in the present either. Since they are not passing any authentic time together, each individual in this multiplicity emanates boredom and indifference. The present time literally does not exist as they are not aware of it outside of their desire for it to disappear since the only moment in time that matters to them is the point of the temporal axis in the future when the bus will arrive. The passing instants until that moment are identical, possessing neither singularity nor value for the group. The only thing to distinguish each of these instants from one another is a number that exists as part of a logical succession in a timeline (e.g., 6:45, 10:58, 16:21, and so on). A "succession thus takes the form of a continuous line or a chain, the parts of which touch without penetrating one another" (Bergson, 2001, p. 114).

The unexpected event does not come in an instant with a number. It is completely unpredictable and as such falls outside of the "timeline" of anticipation. It breaks not only the successive logic of actuality, consisting of an uninterrupted chain of identical instants leading inevitably to the arrival of the future (the bus, in this case), but also the logic of the possible understood as a number of alternative choices. The event lets radically new possibilities emerge. The group is internally modified from a homogeneous into heterogeneous multiplicity, and from juxtaposition of bodies in space into an assemblage of conscious subjects trans-individuating in time. In a heterogeneous multiplicity, the states of consciousness permeate one another. Qualitative multiplicities are temporal since the assemblage they form reinvents itself each moment, an evolution whose continuous phases penetrate one another by a kind of internal growth. Therefore, what changes as a result of the disaster is the dynamic of the group as a whole, its nature from a numerical set into an interconnected yet heterogeneous whole. Instead of separate, unrelated, and distinct from each other, the people impacted by the calamity grow interconnected and aware of their mutual vulnerability. Moreover, this awareness transcends the present time frame, extending into the deep past and deep future of humanity as a whole, connecting the situation in Viola's *The Raft* with its historical prototype, Géricault's *The Raft of the Medusa*, and with future apocalypses as tragic opportunities for catharsis and transformation of human consciousness. Finally, a multiplicity, as defined by Bergson, is not a totality, but rather a singular event, a process of becoming, that is to say, a pure duration, which allows genuine creativity to occur.

In my final remarks, let me summarise some of the conclusions regarding the creative potential of AI (in its current state as an instrument of a neoliberal capitalist economy) vs. artistic creativity from the perspective of their respective relationship with time. The present in the context of predictive neural networks consists of logical relations. It does not have a duration, and consequently it does not know genuine movement or change. Quite the opposite, the present in artistic creation is thick and singular. It cuts through the habitual loop between past experience and future expectations, in which the predictive mind operates on a daily basis. Being disinterested and purposeless, art opens the attention to the full range of sensory inputs available in the present (not only to those which are in the interest of survival). In contrast, preemptive neural networks generate a feedback loop between past data and future predictions which reduces the duration of the present moment to a point of disappearance. They sacrifice genuine engagement with real-world systems for speed and speculative effectivity, and therefore lose their ability to predict (or generate) a future radically open to novelty. Instead, their imaginative capacity is reduced to a bad repetition of the same.

In both cases the present is indeterminate and unpredictable. However, while unpredictability in artistic creation is absolute (outside of the totality of the system), the algorithmic accidents are relative as they are an internal element of the evolution of the technological system itself. Therefore, while artistic creativity mobilises the transformative power of duration via intensified attention to the present in its pure emergence, AI uses prediction as a means to circumscribe the indeterminacy of the present, which eventually leads to the shrinking of the horizon of the future.

References

Bergson H (1992) *The creative mind*, (trans. Mabelle L. Andison). New York: The Citadel Press.

Bergson H (2001) *Time and free will: An essay on the immediate data of consciousness*, (trans. F. L. Pogson). New York: Dover Publications.

Clark A (2016) *Surfing uncertainty. Prediction, action, and the embodied mind*. Oxford University Press.

Domingos P (2015) *The master algorithm*. New York: Basic Books.

Hayles N K (2017) *Unthought. The power of the cognitive nonconscious*. The University of Chicago Press.

Hui Y (2015) Algorithmic catastrophe–the revenge of contingency. *Parrhesia*, 23: 122–143.

Hui Y (2016) *On the existence of digital objects*. University of Minnesota Press.

Hui Y (2019) *Recursivity and contingency*. Rowman & Littlefield International Ltd.

Hui Y (2021) Problems of temporality in the digital epoch. In *Media infrastructures and the politics of digital time,* eds K. Stine, A. Volmar, 77–87. Amsterdam University Press.

Stiegler B (2015, October 18). Power, powerlessness, thinking, and future (trans. Daniel Ross). *LA Review of Books*.

Thrift N (2008) *Non-representational theory: Space, politics, affect*. London: Routledge.

CREATIVITY THROUGH AUTONOMY: THE REAL CHALLENGE OF THE COMPUTER ART TODAY

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Abstract:

This paper questions the notion of creativity found in certain artworks produced with A.I. technologies. The artistic examples concerned are: *The Giver of names* by David Rokeby, *Oscar* by Catherine Ikam and Louis Fléri, and *Emotion Vending Machine* by Maurice Benayoun. These artworks were selected because they stand out for their autonomous behavior in front of the human public. In this context, creativity is revealed as a consequence of the functional autonomy, which is very typical of these pieces of art. The intention is to establish a relationship between the notion of autonomy and that of creativity, reviewing their meanings and applications in philosophy and in the field of life science.

For this, the notion of autonomy is approached from Kant's definition as a decisive value indicating the moral principle that defines the individual and his free conduct, and then approached as a property of life from Francisco Varela and Humberto Maturana's research. Autonomy is also a tendency that characterizes a general process of technical lineages according to Chapoutier and Kaplan. In all these studies, autonomy presents complementary meanings that help us to draw parallels with the notion of creativity. The analyzed artworks allow us to visualize some ways of simulating creativity, while offering unique aesthetic experiences. From a broader perspective, this paper promotes the vision that some computer artworks open up as multi-sensory and multi-conceptual universes, projecting original ideas, and making us feel the very human substance of these technologies. Interacting with these artworks, we are placed at the heart of the aesthetic metamorphosis provoked by the phenomenon of the computer revolution.

Key words: computer art, artificial intelligence, autonomy, creativity, interactive art.

This paper proposes an analysis of the artistic works made with A.I. technologies whose interactive modes allow them to be considered creative with a view to their functional autonomy. Therefore, the intention is to reflect on the relations between autonomy and creativity that are woven into the context of these works, and to examine the possible uses and reformulations of these notions from an aesthetic point of view. This paper will attempt to establish some parallels between the notion of creativity–first as an artistic faculty, then as a concept specific to the life sciences. It will, furthermore, examine its forms of simulation in the digital universe, or what is also called computational creativity.

Currently, there is a whole generation of works resulting from the use of A.I. technologies; these include photographic or videographic installations, or works in various virtual (but not interactive) formats. Very often these works give visual form to the automatic processes involved in computer-generated imagery,which remains one of the branches in computer art and one of several ways of conceiving images by digital means. Let us take as an example the project "Myriad (Tulips)," (2018) by Anna Ridler,[1] in which the artist feeds an artificial intelligence with 10,000 photographs of tulips. The aim is the creation of new tulips, generated artificially, having as reference the photographs made by the artist and fed to the program. This project raises a series of questions whose answers remain elusive: What is the

[1] https://emare.eu/works/mosaic-virus-2018

artistic interest of this project? Does it propose a visual innovation or an aesthetic questioning from the point of view of art, or is it mainly a demonstration of technological performance? Are these tulips as moving and impressive as William Latham's artificial forests (Organic Art project), which in the early 1980s heralded the appearance of an entirely new technological and aesthetic universe in art? Will we be able to detect the traits of a computational creativity emerging within this work, which itself questions the very notion of creativity?

To shed light on these questions, we will look at three works resulting from the use of A.I. technologies, whose interactive structures allow for interpersonal contact between the public and the work. My first example is Maurice Benayoun's *Emotion Vending Machine* project. The project puts us in contact with a creative machine that feeds on human emotions. It consists of four screens that display schematic maps of the globe, and two explanatory tables: the first one provides a list of nine emotions (including fear, joy, ecstasy, etc.) and the second one explains how to interact with the machine.

The public is invited to choose three emotions from the list. These emotions, reported as keywords, are found online in the contents of the websites with the help of a search engine. Their geographical incidence is visualized on the world map, giving a fairly accurate idea of the use of these concepts. The machine then links the emotions with the data collected online to compile new musical sequences. The results can be saved on a USB stick or downloaded via Bluetooth[2].

It is difficult to say that *Emotion Vending Machine* understands what joy, fear, or excitement are. Lacking a semantic base, the work only retrieves human emotions represented as writing in online sites indicating their geographical location. However, it is able to combine the data entered by the audience with the results captured online and then create musical compositions inspired by these processes.

Emotion Vending Machine operates a symbolic exchange in which human emotions become the basic data for its creations. It receives, reads, organizes, and processes this data, which is returned to the audience as audio-visual compositions, proof of its creative potential.

Another work that evokes the crossroads between the world of humans and machines is *The Giver of Names*. Developed by David Rokeby, this work is conceived as a computer system, endowed with vision and able to name the objects it sees. It is presented as an installation that includes a base, a camera, a computer system, which is the intelligent agent, and a video projection. The camera observes the top of the base, which is surrounded by objects. The visitor can choose an object or a set of objects, or something they are carrying, and place it on the base. Once placed on the pedestal, the object is captured by the camera and transmitted to the computer as an image. Then the object is analyzed by the agent on several levels: in terms of contour, color, texture. The program also takes into consideration the parts of the object and their relationships. The analysis sequences performed are visualized on a video projection above the base.

As the analysis proceeds, the objects transformed into images and transcribed by the agent become increasingly abstract and simplified. In this way, the agent purifies the objects it sees in order to assign values to them. The attribution of values is made from a knowledge base of about 100,000 words and ideas that the agent is able to associate with the captured objects. This knowledge base operates according to a syntactic structure that allows it to compose grammatically correct sentences.

Thus, for each object or group of objects, the agent creates a sequence of words or a sentence that expresses the content of what it sees. The respective contents of the agent's visual experience are displayed on the computer screen and read aloud by the agent. The sometimes funny and poetic, sometimes absurd and totally meaningless sentences immerse us in the sensitive world of this work. We are put in immediate contact with what could be understood as the state of mind of this creature and its capacity for interpretation. The 'effort' to share its inner world, to express itself through natural language by telling us what it sees, is actually moving. Our most spontaneous reaction is to want to talk to it to start a dialogue with it.

The third work is the interactive virtual portrait *Oscar*, created by Catherine Ikam and Louis Fléri (2008). *Oscar* is a virtual being that inhabits a painting, like most creatures from the world of visual arts. Calm and silent, he gravitates within the closed space of his frame. Nothing happens; he is there like a soul trapped in a mirror. When we approach him, a sudden reaction in his eyes makes us understand that he knows we are there, that we share the same space. His gaze projected outwards accompanies our movements; he reacts to our presence, he looks at us,

[2] http://www.benayoun.com/projet.php?id=116&lang=fr

smiles at us, approaches us, or ignores us. His behavior is modeled on ours. His physical and emotional presence is more than real. Very comfortable, serene, he is there to observe us, to witness our visit. After a few minutes in his company, we feel the strange sensation of having encountered this creature on an intimate level, but also of having been contemplated by someone who is trying to know us.

When reading the texts of *The Giver of Names*, listening to the songs of *Emotion Vending Machine*, or exchanging glances with *Oscar*, our consciousness is constantly teased. Capable of unexpected reactions or creative improvisations, these works surprise us with their independent behavior, guided by their own structures that we are unaware of. We perceive them as beings in their own right, as autonomous subjects–as beings who determine themselves by their ability to exist without the help of others. In the attempt to define their specificity as works, the notion of autonomy naturally emerges. If we understand autonomy in its primary etymological sense[3]–to govern oneself–it is the strongest and most remarkable characteristic of these works. But to what extent can it be used to analyze the modes of operation of the works cited? Is there a definition of autonomy that allows us to think about these works?

About autonomy

The meaning and nuances of the concept of autonomy are constantly being redefined in different contexts, even though its essence is always based on the trait of independent behavior. From a philosophical point of view, autonomy is both a quest of the individual and a project of the state. It has a moral and political value. In the developmental context, autonomy marks the child's stages of growth and maturation; the child's evolution is a journey towards autonomy.[4] Whereas, in medicine, autonomy indicates the physical state of the patient capable of caring for himself.

In order to better understand the ways in which the notion of autonomy applies, we will examine it from a philosophical perspective and then examine its meaning in the context of our reflection. Taken in a philosophical and political sense, autonomy becomes a dense concept very often used to indicate both the right and the ability to govern oneself according to one's own laws. Making one's own laws is a process that generates a system of moral and ethical values. Being autonomous also requires a sufficient level of judgement to be able to make decisions, choices, and act according to one's own will. Autonomy thus implies the existence of a conscious subject with a will, evokes the philosophical notion of free will, and in a broader sense, the freedom of the individual.

In modern philosophy, autonomy is carefully analyzed by Kant, who considers it a quality of reason. According to Kant, rational knowledge is either material or formal.[5] Material knowledge is concerned with objects and deals with the laws to which these objects are subjected. The laws governing objects fall within two categories: the first category concerns the laws of nature, called physical, which Kant also calls 'natural philosophy'; while the second category includes the laws of freedom, also referred to as ethics, or 'moral philosophy.'[6] It is in the context of moral philosophy that autonomy arises as a determinant in the expression of the human will, as well as in the choice of laws governing the will. Kant writes:

> The autonomy of the will is that property of the will to be its own law (independently of the nature of the objects of the will). The principle of autonomy is therefore to opt always in such a way that the will can consider the maxims, which determine its choice, as universal laws.[7]

Autonomy is no longer just the ability to act independently, but to create rules that guide one's actions–an ethical quality of reason. In Kant's reflections, autonomy takes on a decisive value, indicating it is the moral principle that defines the individual and his free conduct.

In his study on the autonomy of the will in Kant, Olivier Dekens explains the relationship between freedom and autonomy in the following way: "Freedom then consists in the power to act according to a law that the subject gives himself. It is syn-

[3] The etymological origin of the word autonomy is as follows: autos = self; nomos = law, rule. Hence autonomy = the ability or right to give oneself (one's decisions or actions) one's own law or rule, which is translated into English as self-governance.

[4] J. Morin et J.-C. Brief, *L'autonomie humaine – une conquête de l'organisme*, Presses Universitaires de Québec, Québec, 1995.

[5] Emmanuel Kant, *Critique de la Raison Pratique, précédée de Fondements de la Métaphysique*, (trad. J. Barni), Éd. Librairie Philosophique de Ladrange, Paris, 1848, p. 3.

[6] *Ibid*., pp. 4-5.

[7] *Ibid*. p. 90.

onymous with autonomy, and therefore coincides with a freedom subject to the moral law."[8]

Autonomy thus becomes the fundamental basis of freedom. It is demonstrated by the ability of the being to make its own moral law and to submit to it by respecting the moral maxims of this law, independent of the object of its desire. Dekens concludes: "Identified then with the autonomy of the will, freedom is no longer merely an idea, but a reality posited by practical reason when it discovers the fact of moral consciousness."[9] Autonomous behavior implies the capacity of the being to make decisions and to carry out a series of actions to accomplish these decisions without being ordered by someone else. It is exactly in this sense that artificial intelligence seeks to create so-called autonomous machines, and it is in this sense that the problem of the ethical conduct of a machine always arises, knowing that it is currently incapable of discerning right and wrong. In other words, even the most sophisticated machine nowadays is incapable of moral autonomy in the Kantian sense.

At the beginning of the 1970s, the biologists Francisco Varela and Humberto Maturana began to question what life was, how it was organized as a system, and what its most remarkable characteristic was. In order to conceive a definition applicable to all living organisms, they asked themselves what was specific to life. In their book *Autopoiesis and cognition: The realisation of the living*, Varela and Maturana put forward the idea that the inherent properties of the living are self-production and autonomy.

To explain the complexity of living organisms, Georges Chapouthier and Fédéric Kaplan use the expression "nested stages."[10].Using this image, researchers can break down a complex organism into its organs, which are in turn broken down into cells, etc. Autonomy emerges as each nested stage is built up, corresponding to the complexity of the organism: "As in a mosaic in the artistic sense of the term, living beings are nested stages, where each stage leaves autonomy of functioning to the underlying stages. As in a mosaic, the overall image leaves the tesserae that constitute it with their colour, shape, or brilliance."[11]

It is important to stress that the modern sciences adapt the notion of autonomy according to their subjects of study, and that the uses of the term may vary to the extreme. In our thinking, autonomy becomes an interesting concept insofar as it is detected as an ability in machines and animals, along with other abilities such as the ability to learn, to memorize, to develop a culture, or to experience sensations, which are still considered as human properties. In this perspective, autonomy is thought of as both a biological and a technological trait, which determines the complexity of an organism or a machine. We then speak of degrees of autonomy, which are directly linked to the levels of intelligence and forms of consciousness of the being in question.

In contrast, in the case of technical objects, Chapouthier and Kaplan point out that research into the possibilities of designing autonomous machines is a general trend.[12] At the heart of this trend is the effort to build a memory capable of reinterpreting experiences, of learning, but also of making predictions, projecting into the future. Similarly, the mechanisms of automation, self-regulation, and control are developed with the same aim, namely, to make the functioning of machines more autonomous.

In the context of these works, autonomy represents their most remarkable feature, because through contact with them, our consciousness is permanently solicited. Capable of unexpected reactions or creative improvisations, these artistic works surprise us with their independent behavior guided by specific structures that elude us. We perceive them as autonomous beings, or rather as autonomous subjects, i.e., as beings capable of existing without external help. Here, autonomy refers to the level of interactivity and evolution of these works. Consequently, for a computer work to be understood as autonomous, it must behave as an animated object, capable of reacting in an *independent* way, or of providing its audience with unpredictable responses in the interaction processes.

This is the notion of autonomy understood as a functional feature of the artwork, derived from the technological structures developed with I.A. technologies and characteristic of these latest generation of computer artworks. According to Chapoutier and Kaplan, there is a general process of technical lineages that is characterized by the tendency towards autonomy: "the hand hammer was followed by the drop hammer, the rolling mill and then the robot."[13]

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[8] Olivier Dekens, *Fondements de la métaphysique de mœurs de Kant,* Éd. Bréal, Paris, 2001, p. 30.
[9] *Ibid.*, p. 42.
[10] Georges Chapouthier et Frédéric Kaplan, *L'homme, l'animal et la machine*, Éd. CNRS, Paris, 2011, pp. 5-7.
[11] *Ibid.*, p. 15.
[12] *Ibid.*, pp. 32-36.
[13] *Ibid.*, p. 33.

Researchers observe the same trend in the biological world and draw a comparison between these spheres to initiate a debate on complexity.

The idea that the autonomy gained by biological species can be found in the evolution of technological objects is quite logical. In this sense, it is interesting to consider creativity as an ability of biological or technological systems, which participates significantly in their emancipation towards autonomy, and which subsequently manifests itself as the result of this emancipation. This situation can be observed in the context of the studied works. The autonomy demonstrated in the interaction with these works impacts us because it bears the traits of the new, the unusual, the surprising–in other words, the works stand out by virtue of their creative responses. Thus, thanks to autonomous behavior, creativity is simulated on the basis of calculations, carried out according to specific rules predefined in the computer structures of these works. It is in this sense that it becomes possible to establish an analogy between the notion of autonomy and the creative behavior of these works, but to do so, we need to deploy some ideas related to creativity.

About Creativity

To address creativity in a synthetic way, in a few paragraphs, may seem rather risky, as this notion is both the cornerstone of artistic methodologies and one of the most current issues in computer art. In the first case, creativity is understood as the common thread in artistic practice. It is expressed in the methods of conceiving new ideas and new objects and refers to the phenomenon of artistic genius. In the second case, human creativity is deconstructed as actions to be compared with the processes performed by the machine when it finds a solution to a problem or designs new prototypes. Nevertheless, in order to understand creativity within the works cited, it is important to define a more precise framework for it.

t is curious to observe that, although the concept of creativity is quite present in contemporary discourse, it is only indexed in French dictionaries from the 1970s onwards.[14] It would seem apparent that the importance of and the interest in this notion have been growing ever since, and that this was a period of strong technological momentum, itself the result of a sequence of creative avalanches. We can ask ourselves whether humanity has ever created such a varied and significant number of ideas, technologies, products, and services in such a short time, and thereby perhaps understand why this notion has taken on such significance. For this reason, I believe that creativity must be considered from a multidisciplinary perspective, going beyond the focus of individual subjectivity or artistic methodologies.

Creativity in the first degree always refers to the conception of an unknown object or idea–'to create' in an absolute sense means to produce something ex nihilo. While in human activities creativity manifests itself in very different ways depending on the type of activity, in the sense of biology, for example, it is a necessary characteristic for the evolution of species. An organism manifests the level of its intelligence in its ability to create. When adaptation does not go smoothly, the physical existence of the organism is threatened, and it is forced to find solutions in order to survive. In the search for adequate solutions, creativity is fundamental.

Similarly, the notion of creativity considered in the context of artificial intelligence is, for many specialists, the last evolutionary step for intelligent machines. It is obviously very difficult to draw a boundary, or even a precise relationship, between the notion of intelligence and that of creativity. If we understand creativity as the ability to bring something into existence out of nothing, or to conceive of something material or spiritual for the first time, it can be seen as a fundamental facet of intelligent behavior, hence the continuing interest in this notion by A.I. researchers.

Creative ability can also be seen as a distinct form of intelligence within the model of different types of intelligence. It is in this perspective that Todd Lubart defines creative intelligence as "a dynamic construct whose specific nature varies according to the environment in which the task is performed."[15] The notion of creativity, considered in the light of human symbolic abilities, is of substantial interest to our reflection, because it is precisely the human traits that are the most difficult to reproduce by machine, and in this context, a work equipped with A.I.

For Marvin Minsky, designing a creative machine does not represent a particular difficulty:

[14] Voir R. Huyghe, A.-M. Descamps, J. Donnard, *Art et Créativité*, Éd. Trismégiste, Lavaur, 1991, p. 99.

[15] Todd Lubart, « Intelligence créative » (pp. 59 – 74) in *L'intelligence: Traité des sciences cognitives*, J. Lautrey & J.-Fr. Richard (dir.), Éd. Hermès Science, Paris, 2005, p. 60.

> Speaking of 'creativity', it is easy to program a machine to spout an endless stream of things that were never conceived before. However, what distinguishes the thinkers whom we call 'creative', is not how many ideas they produce – not even how novel those concepts may be – but how effectively they can select which new ideas to further develop.[16]

Indeed, machines are capable of an enormous number of calculations, executed in record time. Through random processes, they simulate chance by combining data to compose novel results, which can be surprising. However, are we supposed to recognize these results as genuine machine creativity in the same way that we recognize human creativity when we face a new artwork or idea? If our answer is 'yes,' then we have to admit that creativity can be materialized from sequences of computations that involve neither consciousness nor intentionality, or that consciousness and intentionality are predefined in the human actions that initiate the operation of the intelligent machine. And in this situation, it is prudent to take into account every form of human participation, even as a peripheral factor, which leads to a new set of considerations. I believe a wider understanding of the notion of creativity may help us in the continuation of this reflection.

A very rich approach to the notion of creativity is given by Henri Atlan. He proposes that we approach creativity not as a phenomenon located within a human subject, but at the "infra-human" level– "that of living organisms, of their physico-chemical structures, of their individual and species behaviour."[17] According to Atlan, creativity corresponds to the appearance of the new in nature and must be analyzed at several levels. It thus manifests as the result of the adaptation of organisms to changes in their living environment. In this sense, "human cognitive activities are naturally seen as an extension of the assimilative activities that characterise the development and functioning of living beings."[18]

Atlan approaches the problem of the complexity of living beings, the behavior of systems, and the emergence of the new in nature from the perspective of the phenomenon of self-organization. Self-organization is a notion that refers to the capacity of systems to restructure themselves to improve their performance without interference from external sources. Self-organization is characterized by "an optimum state between, on one hand, a rigid and immovable order, incapable of being modified without being destroyed, such as that of a crystal for example, and on the other hand, an incessant renewal, without any stability, evoking chaos and the wisps of smoke."[19] But this state itself is not static. It is susceptible to unforeseen changes, brought about by chance. Self-organization arises in this movement between the stable and the uncertain, particularly in order to reorganize the existing system. In the processes of reorganization, new behaviors and new properties of life can emerge. Thus, the notion of creativity becomes central in the studies of the complexity of life and its evolution, and consequently in the simulation of life and intelligence.

Atlan's theory has certain convergences with the theory of Dominique Lestel, who refutes the idea of man as *the only animal of culture*.[20] The latest research in ethology considers the existence of different symbolic aptitudes in other animal species. From the point of view of the diversity of living species and from an evolutionary perspective, Lestel asserts that there is "a plurality of cultures, (...) by nature bearing different characteristics."[21]

Lestel's and Atlan's research not only expand upon the theory, but also change the perspective, allowing us to consider the notion of intelligence, and more specifically the aptitude for symbolic constructions and creativity, in a much broader and more universal way. It is a radically new look at human identity as a species and as a society. For Lestel, it is about "fully accepting intelligent artefacts in human/animal/machine hybrid communities," and this is "one of the major challenges of the coming centuries."[22]

I am convinced that these ideas will lead to a significant transformation of human mentalities, and that in this transformation, the role of art, and more precisely of aesthetic experiences, which implement symbolic exchanges between humans, machines, and other living species, is imminent. I am considering in particular the power of artistic works when pro-

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[16] Marvin Minsky, *The Emotion Machine*, Simon & Schuster Paperbacks, New York, 2006, p. 278.
[17] Henri Atlan, « Créativité biologique et auto-création du sens » (pp. 113-155), in *Création et Créativité*, Éd. Castella, Paris, 1986, p. 113.
[18] *Ibid*., p. 114.
[19] *Ibid*., p. 133.
[20] Dominique Lestel, *Les origines animales de la culture*, Ed. Flammarion, Paris, 2011.
[21] *Ibid*., p. 330.
[22] *Ibid*., p. 407.

voking sensations, questions, and spiritual and intellectual openings.

When we experience *Oscar*'s presence, we are aware that it is a program developed with a computational vision algorithm through which a hyperrealistic synthetic image changes position to direct its gaze towards us. We also know that behind the gaze that follows us there is no consciousness questioning our person, and that our presence will not leave any trace in *Oscar*'s artificial memory, so that the next day, if we are back at the gallery, he could recognize us.

Despite this, we feel the effects of his behavior–he is always different in his expressions–sometimes curious, sometimes embarrassed, sometimes absent–he recreates his existence the moment he establishes this non-verbal communication with his audience. We cannot ignore him, just as we cannot forget him, and are left wondering about his fate. In the same way, when we listen to the sounds created by *Emotion Vending Machine*, the melodies evoke in our minds the geographical points where the emotions indicated by us are listed and spread out on the globe. Images of visited places or dreamed destinations float in our mind to the sound of *Emotion Vending Machine*'s compositions, whose creative ability seems impossible to deny. And in the case of *The Giver of Names*, its interpretive abilities, which combine vision and verbal expression in a permanent linguistic evolution, make us think of the history of humanity, whose advancement through discoveries– observations, inventions, creations, and appropriation of concepts–repeats itself with each newborn to move us further forward. Thus, the real interest of these works is the way they are autonomous and subsequently creative in their communication with humans. In this way, they stimulate reflection on symbolic construction skills, autonomy, and creativity displaced from the beaten path of anthropocentrism.

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It is possible to develop a definition of creativity that is specific to these works and precisely identifiable in their operation, which will allow us to better determine the value and applicability of this notion in the context of computer art. This would be a next step in this research. For now, my idea was to analyze creativity as a form of autonomy within certain artworks developed with artificial intelligence.

Through the chosen examples, this text pays tribute to certain computer artworks that open up as multi-sensory and multi-conceptual universes, projecting the original ideas, and making us feel at the heart of the aesthetic metamorphosis caused by the phenomenon of the computer revolution. The functioning of these works, due solely to computer science and artificial intelligence techniques, is their most precious possession. It materializes man-machine communication, experienced as aesthetic exchanges. During these exchanges, which bring human and machine intelligence into direct contact, humans experience the limits of their consciousness and live that singular experience that Mario Costa has defined as the "technological sublime." For this reason, works capable of simulating human symbolic abilities form an innovative and authentic artistic category, hence their true value.

I also defend the idea that a computer artwork that calls itself "A.I. technology-based," "intelligent," or "A.I. enabled" cannot be a finished, static product, printed in a frame or projected on a wall. If its existence is cloistered in such traditional formats, computer principles are used only to achieve visual results or to demonstrate high-tech feats. And in these cases, they are both spectacular and playful experiments, a symptom of the fashionable 'high tech' trends that make us 'talk' more than 'feel.' This, in my view, has been the great bane of computer art since the dawn of its existence.

References

Atlan H (1986) *Création et créativité*. Castella.

Chapoutier G, Kaplan F (2011). *L'homme, l'animal et la machine*. CRNS.

Costa M (1995) *O sublime tecnológico* (trad. Dion Davi Macedo), Experimento São Paulo.

Dekens O (2001) *Fondements de la métaphysique de mœurs de Kant*. Bréal.

Fonseca J (2008, March 25) Autopoiesis: Uma introdução as ideias de Maturana e Varela. Create SpaceIndependent Publishing Platform.

Huyghe R, Descamps A-M, Donnard J (1991) *Art et créativité*, Trismégiste, Lavaur..

Ikam C, Fléri L (2007) Les absences d'Oscar. In *Maison Européenne de la Photographie*. https://www.on-situ.com/en/projets/63/digital-diaries/

Kant I (1848) *Critique de la raison pratique, précédée de Fondements de la Métaphysique*. Librairie Philosophique de Ladrange.

Lestel D (2011) *Les origines animales de la culture,* Flammarion.

Lubart T (2005) Intelligence créative In *L'intelligence : Traité des sciences cognitives,* eds J. Lautrey, J.-Fr. Richard, 59–74. Hermès Science.

Minsky M (2006) The Emotion Machine. *The Emotion Machine.* Simon & Schuster Paperbacks.

Morin J, Brief J-C (1995) *L'autonomie humaine – une conquête de l'organisme*. Presses Universitaires de Québec.

Varela F, Maturana H (1980) *Autopoiesis and cognition: The realization of the living*. Kluwer Academic Publishers.

ARTIFICIAL INTELLIGENCE: THREE PHILOSOPHICAL INTERPRETATIONS OF THE ANTHROPOCENTRIC FRAME OF REFERENCE

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Abstract:

The author discusses the problem of what AI is and how we can understand the "anthropocentrism" of AI from a philosophical point of view. Three interpretations of the relationship between humans and technology are presented: 1) AI-aided human intelligence, based on the extension theory of technology (Stiegler, 1998); 2) human-aided AI intelligence, based on ideas related to political economy (Crawford, 2021); and 3) the relativity of the anthropocentric frame of reference (AFR), based on the taxonomy of species.

The purpose of the article is to provide considerations of the three different interpretations of the relationship between humans and technology and how they lead to different opportunities to answer the question of how we can understand AI's creativity.

Key words: AI, anthropocentric frame of reference, philosophy, creativity.

Artificial Intelligence and AFR

Artificial intelligence (AI) is probably one of the most discussed concepts today, attracting significant media coverage and dramatic headlines. The Google search engine returns 5 220 000 000 entries to the question "what is AI?" which is 3.6 times more than the entries it returns to the question "what is philosophy?" (1 470 000 000) (as of 12, 01, 2023). Both searches give impressive results, but the significance of AI is indisputable, considering the number of results that are retrieved for the single keyword "AI" (9 180 000 000 entries) in comparison to "philosophy" (1 590 000 000).

"AI" is an impactful keyword that competes for popularity with the entries for "Apple" (9 620 000 000) and wins against "Amazon" (6 800 000 000) and "Microsoft" (4 590 000 000). The frequency of public discussions regarding AI strongly surpasses discussions of poverty and pollution, encouraging further circulation of technological content. The problem with these statistics is that the conversation about AI is not only technological. The context of AI's development and application extends far beyond conversations in *Wired*, *Medium*, business consulting websites, blogs, social networks, etc., and reaches billions of actual lives and physical bodies.

More than two thousand years ago, Greek philosophy began questioning the existence and the elements of being. There was no science at this time–only myths and some philosophers. It was centuries before beliefs about the structure, laws, and processes of nature were scientifically studied and scientific knowledge was established. In the time of myths, religious beliefs, and superstitions, philosophy tried to ask the right questions and find answers, even if these threatened the status quo. Today, technology is far more powerful than human societies are mature in their use of it;, AI development thus presents the same challenge to human beings that nature presented for centuries to the illiterate and superstitious populations of Europe.

Philosophy is a process of rational reasoning and reflecting on the unknown, and the twenty-first century marks a challenging time for philosophy again. Much is unknown about AI, a technology which promises to shape our digital future. Machine learning, neural networks, intelligence as simulation, and hardware and software are elements that begin to describe the concept of AI, but they do not capture it in its entirety; human perceptions, desires, fears, and beliefs also contribute in addressing the question of what AI is and what it will become in the future. The human context of AI's creation and use also explains the importance of the so-called "anthropocentric frame of reference" (AFR).

In his article on the measurement of intelligence, the developer François Chollet explains the necessity of AFR. He argues in support of efforts to develop "a specifically humanlike form of intelligence, and…benchmark progress specifically against human intelligence" (Chollet, 2019, p. 24). The strong anthropocentric bias in the evaluation of AI's abilities means that AI should be able to communicate knowledge in a way a human can make sense and use of. More precisely, in the quest for training general AI (AGI), the measure of success Chollet suggests is the AI's ability to "adapt to change, acquire skills, and solve previously unseen problems" (Chollet, 2019, p. 20) in a way that "makes sense within the frame of reference of human values" (Chollet, 2019, p. 21).

The expected scope of application of AI technologies is human and it requires the controlled development of AI with consideration to human needs and values. Although new definitions of intelligence challenge AI to set its own goals and build a strategy to achieve them "in a wide range of environments" (Chollet, 2019, p. 4), they are expected to stay within the human scope of application.

The purpose of this article is to discuss AFR philosophically and examine how AI relates to humans and human abilities like creativity. The answer to the question of what AI is (and how we evaluate what it can do) depends very much on the nature of the human-AI relationship.

I will present three interpretations of AFR and how they reflect my initial position on the question of what technology is. I will use the concept of "human-likeness" synonymously with "anthropocentrism"

AI-aided human intelligence: Technogenesis is anthropogenesis

Approaching the question of what AI is from the perspective of the theory of technology as prosthesis (Heidegger, 1977; Stiegler, 1998) introduces a certain perspective on the relationship between humans and AI that may be described as a kind of cyborg relation, which allows us to see the "human-likeness" of AI as *AI-aided human intelligence*.

According to extension theory, contemporary human evolution is not independent of the evolution of technology, and our knowledge about the world is intertwined with the very technologies and methods that are used to obtain, communicate, and convey knowledge into the future. The evolution of technologies is the evolution of the extended human body, and there is no line of separation between biology and technology (Stiegler, 1998). For this reason, "anthropogenesis and technogenesis are the same phenomena considered from two different points of view" (Possati, 2023, p. 9).

The technological change starts as a process of "detaching" and outsourcing human cognitive abilities to external physical devices like books and computers. The relationship, however, between technology and human beings is dynamic. Books, for example, augment memory in a way that requires additional education and training, and thus have conditioned the further evolution of humanity, which manifests in the relation with technology and its role in the development of science. In this way, technologies not only augment human memory or reasoning abilities but facilitate new forms of (human) intelligence.

Taking the extension concept as a framework for understanding technology influences the way we may think about AI–not in terms of the "simulation" of human intelligence, as though AI reproduced human intelligence in a second reality, but as an extension of human intelligence, which adds processing strength, speed, and memory to human capacities and creates "a profound continuity between biological and technical life" (Possati, 2023, p. 7).

The increasingly symbiotic relationship between technology and human biological intelligence presents an exciting opportunity to potentially augment human cognitive abilities. Within extension theory, use of retinal implants or other medical technologies provides a good example of how AI is meant to augment human sensory and cognitive abilities when technology and biology become bound together in the living organism. Although such a situation may introduce a great many risks and ethical issues, it does not directly precipitate the scenario of AI gaining control over humanity, which is a common fear regarding AI technologies.

From the point of view of AI-aided human intelligence, creative abilities never belong purely to the technological side, although technology provides the overarching framework for creative action. In contrast to previous technological advancements (e.g. printing), digital technology provides entirely new tools that direct the ways in which human beings can express their creativity and offers solutions to creative problems.. Following Howard Cohen's "AARON," hundreds of art projects have been created that reveal the new horizons of AI-aided human creativity.

The question regarding independent AI creativity, however, makes more sense in the context of independent AI and its creations.

Human-aided AI intelligence: Alienated AI

A second way to see the "human-likeness" of AI is in terms of *human-aided AI intelligence*.

No technology is developed only to remain outside of the productive forces and the general socio-economic context of its time. This is an important part of the connotation of the concept of AFR. Technology is meant to add value to human productivity in qualitative or quantitative terms. Without increasing or improving productivity, innovation, and creativity, it is useless. And no technology inspires the ambitions of increasing productivity, innovation, and creativity more than AI–either through the augmentation of human abilities or through automation.

Of course, despite the fascination they inspire in the human imagination, the complexity of kitchen robots falls far short of that exhibited by the well-informed "dialogue" with a language model like OpenAI's ChatGPT (OpenAI, 2023) or the programs trained to produce works of art, poems, or music. Apart from being the intellectual property of a single person or company, all of these are products of something much more significant: the "general intellect."

Marx is the first to talk about the formation of the "general intellect" as a product of science and technology with an effect on production: "…general social knowledge has become a direct force of production, and… hence, the conditions of the process of social life itself have come under the control of the general intellect and been transformed in accordance with it" (Marx, 1973, p. 706). Human collective intelligence and labor, AI and productivity, are interconnected in terms of economic growth.

Marx's short remark about the general intellect was expanded upon by the school of 'operaismo' in Italy in the 1960s and 1970s (Ganov, 2021). Negri and Hardt (2000) explain that the "general intellect is a collective, social intelligence created by accumulated knowledge, techniques, and knowhow" (Negri & Hardt, 2001, p. 364) and recognize it at present in the form of "science, communication, and language" that have been turned into a productive force (Negri & Hardt, 2001, p. 364).

AI development concentrates significant resources on natural language processing. Its training is performed on large language datasets including books, articles, and websites–all of which present a good illustration of "formal and informal knowledge," "mentalities," *or* "language games," which Virno (2007) references in his research:

> The 'general intellect' comprises formal and informal knowledge, imagination, ethical inclinations, mentalities and 'language-games'. In contemporary labor processes there are thoughts and discourses that function as productive 'machines' in their own right, not needing to take on a mechanical body or even an electronic soul (Virno, 2007, p. 5)

The very abilities of AI in content production and data processing make it a perfect example of how the general intellect can consolidate into more and even more powerful tools designed to improve productivity.

AI is usually considered the property of a corporation. Nonetheless, behind any complex machine learning system, such as Alexa, Siri, or Cortana, are thousands of hours of labor contributed by human beings, who–whether they are aware or not–also took part in the process of their creation.

Following Crawford (2021), Possati (2021) summarizes the socioeconomic complexity behind AI*:*

> *…AI is not only a bundle of software. What we do not see 'beyond' the software is an immense mining industry that exploits energy and mineral resources, cheap labor, and, finally data that are chosen by users according to their wishes. AI is not just what we see on a screen. Instead, it is an immense supply and logistics chain that envelops the entire planet with significant social, political, and environmental consequences (Possati, 2021, p. 16).*

Discussing AI's development in a socioeconomic context that acknowledges the realities of the corporate world and profit motive reveals a critical point of view on the ways in which "human-likeness" and anthropocentric concepts struggle to achieve consistency due to the challenges posed by social and global inequalities. This critical viewpoint raises some key questions: to which human beings is the potential value of AI relevant? Whose values will be represented and respected in the development of AI? Who will pay the environmental, social, and ethical price of developing these technologies?

Crawford (2021) discusses the gigantic scale of unpaid or low-paid human work from all parts of the world involved in AI training. Irani (2015) discusses the technology of Amazon Mechanical Turk and describes how humans serve as "fuel" for the service-hungry models, their time, bodies, and minds sacrificed for the education, training, and support of "intelligent" AI assistants.

Crawford's thesis is daring. Behind AI she sees "the massive industrial formation that includes politics, labor, culture, and capital" (Crawford, 2021, p. 9). She argues that "AI is neither artificial, nor intelligent" (Crawford, 2021, p. 69), and that AI technologies cannot be viewed "independently from their creators, infrastructures, and the world at large" (Crawford, 2021, p. 215). In this interpretation, technology is seen as a practical tool, utilized by entrepreneurs to optimize the performance of workers and to increase productivity in capitalist enterprises.

AI is a powerful technology external to the human body that allows for memorizing, analyzing, synthesizing, processing data (augmentation), and managing physical tasks (automation); nonetheless, its existence and operation are exploitative "human-fueled" processes (Crawford, 2021, p. 63) completely dependent on workers' labor and completely indifferent to their values, will, and goals. These individuals carry the burden of alienation. Indeed, according to Crawford, AI is a system sustained by human bodies and minds, and unless "this collaboration is…fairly negotiated" by the leading AI-developing companies (Crawford, 2021, p. 19) and unless the applications of AI technologies are regulated ethically, the concept of AFR will suffer deeply.

The negative sentiment within this approach is strong and is also present in Bostrom's scenario in which (general) intelligence is taken as "alien," and the ultimate detachment of AI from human beings is realized (Bostrom, 2014, p. 59). There is a vision of alienated AI that Bostrom suggests when he comments on the opportunity for the "recursive self-improvement" of AI; in this situation, AI can improve its architecture, leading to an "intelligence explosion" and the development of an "extremely alien" intelligence "with very different cognitive architectures" (Bostrom, 2014, p. 59) and "goal systems" (Bostrom, 2017, p. 60). In this vision, AI becomes independent of human values, will, and goals, thus representing an advanced-technology metaphor for the rule of capital over living human beings.

Science fiction tends to present AI as a form of intelligence that builds its own personality and consciousness, and this is often seen as an unwelcome and intimidating side-effect. The question of whether human beings can acknowledge and value any creative abilities of AI, given that so many find the very concept of AI to be degrading or potentially threatening to humanity, is highly controversial.

I strongly agree with and support Crawford's view that we cannot think about intelligence as if it is independent of the "social, cultural, historical, and political forces" (Crawford, 2021, p. 5) that have conditioned it. Her argument against the perception of AI as "disembodied intelligence" (Crawford, 2021, p. 7) is a compelling one:

> …AI…is both embodied and material, made from natural resources, fuel, human labor, infrastructures, logistics, histories, and classifications; it is not autonomous, rational, or able to discern anything without extensive, computationally intensive training with large datasets or predefined rules and rewards (Crawford, 2021, p. 8).

The concept of a human-fueled general intellect combines the efforts and minds of many designers, developers, and workers busy labeling and rating content. It includes the productivity, innovation, and creativity of members of the anonymous "crowd,"especially low-paid workers and amateur designers who share personal content online for free.

In his work, Dean (2005) explains how content, sender, receiver, and response in online communication are now "irrelevant" because the only thing that matters in "communicative capitalism" is "circulation" (Dean, 2005, p. 58). Dean refers to the work of Agamben (2000) to demonstrate the expropriation of language, which becomes an "essential factor of the production cycle" (Dean, 2005, p. 56).

Given the controversial socioeconomic context of AI development, it seems that AI cannot be credited for creativity insofar as its "intelligence" is perceived as an alienated productive machine dependent on human efforts.

Beyond the AFR

There is a third way to think about AI and AFR–in terms of relativity.

In the taxonomy of species, there is always a larger frame of reference within the ultimate frame of life. For example, humans are classified as living beings within the Eukarya domain and Animalia kingdom. With regard to the many frames of reference that may coexist, AFR is defined and limited by its particular scope, while all other frames are valid at the same time within their own (limited) scope.

In his book, Bostrom (2014) offers a comparison between an airplane and a bird to challenge the theoretical necessity of an anthropomorphic/neuromorphic approach to AI design and argue in favor of purely synthetic AI design (Bostrom, 2014, p. 58). I will expand upon this bird-airplane comparison in my examination of AFR.

The first flying devices were designed by inventors who copied birds, even though airplane wings were never designed to flap like bird wings. In spite of these beginnings,, improvements in airplane design today are no longer based on the study of birds. The science of natural laws provides a more general frame of reference common to both birds and airplanes. At some point in the past, a certain threshold of knowledge in physics was crossed, which provided airplane designers with more correct and relevant methods to build flying machines. Today, planes are still in a sense bird-like but are not modeled after birds.

A similar situation applies to AI design: a certain copying of human intelligence and "human-likeness" may work as a valid model for designing AI, but this is true only until a certain gap of knowledge is filled. Once this threshold has been crossed, it is likely that AI models will increasingly be evaluated and designed in terms of other AI models and other scientific knowledge (e.g., knowledge about laws and forces that relate to more general, non-human, and non-living frames of reference).

Just as the analogy between birds and airplanes sheds light on the relationship between AI and human intelligence, so too do the results of a comparative study in astrophysics and neuroscience, which investigates how matter fluctuations scatter" (Vazza & Feletti, 2020). The authors of this study report finding structural similarities between the network of galaxies and the network of neuronal cells in the human brain. The study reports its findings based on a comparison between a small section of the human brain and a small section of the universe. Along with structural similarities regarding the proportion of the masses of galaxies and neurons *(e.g., galaxies and neurons display* "the same progression of the distribution of matter"), the authors also find that the two systems evolve "following similar physical principles" (Vazza & Feletti, 2020).

The results of this study therefore allow us to extend the birds–airplane–physical laws analogy. It seems that the science of physics points to a more general frame of reference that applies not only to birds and airplanes but also to human brain neurons and the galaxies in the universe. Here, new unexplored fields of knowledge open up. Just as the body structure of birds can be explained by physical laws, human brain patterns may become explainable in terms of physical principles that apply not only to human biology, but to other systems as well. Engineers today may consider their AI models successful because they emulate human neural networks, but it is in fact possible that the AI neural nets are structured and work in a certain way due to general principles which apply to both AI and the human brain. Perhaps at present AI design integrates these principles by blind intuition only, and when these principles are enumerated and understood, the interference between the anthropocentric human perceptions and scientific objectivity in the field of AI can possibly diminish. Once neuroscience crosses this threshold of knowledge, AI designers may refer less to the human brain as a template and more to the body of knowledge of another common frame of reference.

The relativity of AFR means that science is free to follow its objectives justified only by their perceived or assigned value. But favorable perceptions of AFR relativity may positively affect the way we think about AI's creativity.

There are certain aspects of AI's creative activities we as humans may not be satisfied with–for example, the AI model creates a female face but switches the place of the mouth and the eye. However, many drawings in human history have relentlessly deformed the human face and body, and we call these "art." Indeed, despite the celebrity of Picasso's portraits, an image recognition program today could encounter problems determining their subject matters. Going beyond AFR increases our chance of noticing AI behaviors with newfound perceptiveness, some of which may prove creative in unexpected and non-humanlike ways. Within AFR, however, we might not be able to recognize and acknowledge AI's true abilities, a situation that is comparable to those in which human beings fail to recognize animal cognition. (Crawford offers the example of people failing to acknowledge the emotional intelligence of awell trained horse, just because they were concerned with its «reasoning« abilities and capability of successfully «solving« simple mathematical calculations and spelling words (Crawford, 2021).)

AFR creates a kind of protected ("for humans, only!") space to think about AI in terms of human "extension" or as a "productive social force," perspectives from which AI is still judged in reference to human intelligence–either as an organic part of it or an alienated human-fueled threat to it. AFR provides a rich source of comparative knowledge, which strengthens the concept of human identity (and abilities) in contrast to other species. The philosophical challenge of AI's existence is that it raises the question of how this type of intelligence, which is external to and detached from the human body, nonetheless integrates into human life and human social orders.

Historically, there has been no way to think about non-human intelligent behavior except in terms of biology or religion. This fact signals a potential answer to the question of what kind of reaction people may have to increasingly sophisticated non-human intelligence. Humanity's fears about the emotions, feelings, will, and goals of AI have the same root as fears toward any other superior intelligence in human history. This means that the human mind perceiving and judging AI is not a "tabula rasa," but is preconditioned by ideas and prejudices (e.g., fears) that impact their judgments.

What is both great (perhaps grandiose) and small about the human mind is that social consensus is not concerned with the "true" reality. Harari (2014) has convincingly argued that human society functions based on ideas (whether or not these creations of the mind capture external reality), and these imagined "realities" are the soil that sustains and nurtures collective beliefs, despite their incompatibility with scientific knowledge (Harari, 2014). The future of AI promises the emergence of complex problems concerning the ethics of human body modification, the future of work and workers, and the future of human perceptions and beliefs about AI and AI's abilities. In particular, creativity promises to become one of the most controversial topics of discussion.

AI and creativity

Human creativity is acknowledged in different ways, and among the most prominent recognitions of all is the Nobel prize. In his study on Creativity with a big "C" Csikszentmihalyi (2007) included fourteen Nobel prize winners. His system model of creativity consists of three elements–*domain, field, and human creator*–and creativity is defined through the interrelations of those three parts. The definition explains how creativity comes from originality. Something is original when it pushes the limits of its domain; in doing so, it can change this domain significantly or even create a new one. When this occurs, the act of creativity must be acknowledged by the field, a community of experts who confirm the value of the presented work. The vital element here is the creator.

Creativity has mostly been explained in terms of human experiences, lifestyle, emotions, feelings, mentality, motivation, etc. Psychology is the science most associated with the study of it. The deep connection between the concept of creativity and the human being has given birth to such a concept as “genius.” Nevertheless, creativity is not restricted to human ability only. God and animals are also considered “creators.” AI’s creativity, insofar as it appears to manifest in music or texts, is not akin to the creative acts of animals, which may be completely independent of human involvement. On the other hand, unlike animal creativity, and very much like the creativity of God, the concept of AI’s creativity does not seem to make sense in a world without humanity.

AI’s creativity is a special and challenging topic because it interrupts established cultural patterns of thinking about who can be considered a creator. Not being a human being is the “psychological” reason AI cannot be considered for a Nobel prize, even if it makes significant contributions to humanity. However, changes are approaching. The rich history of “thinking machines” leads us back in time as far as the thirteenth and fifteenth centuries (Todorova, 2019) when posing the question of the human-like abilities of the machine would probably sound ridiculous or heretical. Today, extending or outsourcing intelligence to machines changes the way we talk about them; we say that they are getting “smart”– and notably, creativity is nearly always discussed in relation to intelligence, as we find in Csikszentmihalyi’s study on creativity, in Sternberg’s triarchic model of intelligence, and in Gardner’s theory of multiple intelligences. The question of AI’s creativity is no longer regarded as ridiculous or heretical, and in fact, testing and expanding upon the human-like abilities of machines are now everyday experiences.

References

Bostrom N (2014) *Superintelligence: Paths, dangers, strategies*, 1st ed. Oxford University Press.

Chollet F (2019) *On the measure of intelligence*. https://arxiv.org/abs/1911.01547

Crawford K (2021) *The atlas of AI. Power, politics, and the planetary costs of artificial intelligence*. London: Yale University Press.

Csikszentmihalyi M (2007). *Creativity: Flow and the psychology of discovery and invention*. HarperCollins e-books. Retrieved January 16, 2023 from https://www.overdrive.com/search?q=492404D2-4BEA-493B-B26F-D23382E246CA.

Dean J (2005) Communicative capitalism: Circulation and the foreclosure of politics.

Dean J. (2005) *Cultural Politics: An International Journal*, 1(1):51–74. doi:10.2752/174321905778054845

Harari Y N (2014) *Sapiens: A brief history of humankind*. Harvill Secker. Retrieved January 26, 2023 from https://archive.org/details/isbn_9780099590088.

Hardt M, Negri A (2001) *Empire*. Harvard University Press.

Heidegger M (1977) *The question concerning technology, and other essays*. Transl. and ed. W. Lovitt. New York: Harper & Row.

Irani L (2015). Difference and dependence among digital workers: The case of Amazon Mechanical Turk. *South Atlantic Quarterly*, 114(1): 225–234. doi:10.1215/00382876-2831665

Marx K (1973) *Grundrisse: Foundations of the critique of political economy (rough draft)*, translated by M. Nicolaus., London, Penguin

OpenAI (2023) https://chat.openai.com/chat

Possati L M (2023). *Unconscious networks: Philosophy psychoanalysis and artificial intelligence*. Routledge. https://doi.org/10.4324/9781003345572

Stiegler B (1998) *Technics and time. Vol. 1: The fault of Epimetheus*. Stanford, Calif: Stanford University Press.

Vazza F, Feletti A (2020, 16 November). The quantitative comparison between the neuronal network and the cosmic web. *Frontiers of Physics*. DOI: 10.3389/fphy.2020.525731

Virno P (2007) General intellect. *Historical Materialism, 15*(3), pp. 3–8. doi:10.1163/156920607x225843

Ganov D (2018) The Universally privatized intellect. *Philosophical Alternatives*, 3: 29–40.

Todorova M (2019) *Artificial intelligence: A brief history of development and ethical aspects of the subject*. Sofia, East-West. (In Bulgarian)

Book reviews

Review of Nonka Bogomilova's book *The Balkans: Marked Roads (1991–2016)*

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Abstract:
The review emphasizes the main topics and ideas in Nonka Bogomilova's book, *The Balkans: Marked Roads (1991-2016),* and especially the humanist message of the book, which demolishes stereotypes and prejudices about our living space. Special attention is paid to the author's contribution to Balkan Religious Studies as a personal, experience-based insight into the culture and characterology of the Balkans and the Balkan people.

Keywords: Balkan Religious studies, Balkan people, Balkan culture, war, sociology of religion, philosophy of religion

It was with great personal pleasure that I accepted the offer of Dr. Nonka Bogomilova, whom I consider not only a professional colleague but also something more than that–a friend–to write a few words about her book, *The Balkans: Marked Roads (1991-2016),* and about our scientific collaboration.

About the book

This book of memories from her Balkan travels is written with accomplished–one might say poetic–style–because let's not forget that Nonka Bogomilova also has literary ambitions; she is a poetess and has published several collections of poetry. To develop an appreciation for the book, it is enough to read two poems dedicated to Dubrovnik, once a Yugoslav and now Croatian city on the Adriatic Sea, and apparently Bogomilova's favorite city. These are "In Dubrovnik" (Bogomilova, 2020, p. 77) and "I usually go there..." (Bogomilova, 2020, p. 83). Both poems were translated into Serbian by the recently deceased Gancho Savov, a great friend of the Serbs, who spent a decade or more in prison during the regime of Todor Zhivkov.

It is not the purpose of my review to present in detail the content of the book, which is on the border of several genres: it is a successful mixture of travel prose, autobiography, and sociological discussion. As such, Bogomilova deservedly received the high Bulgarian National Award "Hristo G. Danov" for contribution to the national literary culture in the category: "Author in the field of Humanities." Belatedly, I congratulate Mrs. Bogomilova from the bottom of my heart on such a significant award.

For me, the book is first of all–and I emphasize this–a great contribution to *the history of the Balkan sociology of religion,* that is, in a broader sense, a contribution to *Balkan Religious Studies.* Future writers of this kind of history will not be able to ignore it, and it will definitely be on their desk, as it is already on my desk.

The book consists of the preface, "Free to be 'on the road,' and two main sections:I) "WORDS AND WAR: A VIEW FROM DUBROVNIK (1991–2016)" and II) "ON THE 'PATHS' OF THE BALKANS: A VIEW FROM BELGRADE (1991–2016)." These sections contain numerous chapters with several representative photographs, ending with an APPENDIX: *Author's scientific publications directly or indirectly related to the Balkan topic.*

Where has that woman not traveled in the Balkans? Starting from Croatia and Bosnia and Herzegovina, through Serbia, Montenegro, and North Macedonia, to Greece and Turkey, she finally ends her journey and the book about it in her native Kyustendil. Who has she not met and gotten to know along the way? She describes encounters with Rudolf Siebert, Srdjan Vrcan, Ivan Cvitković, Sergej Flere, Ruzhica Cacanoska, and Mirko Blagojević. And perhaps even more important than making the acquaintance of these celebrated scientists, as she herself insists, are her meetings with ordinary people–Balkan people–on the bus, train, ferry and taxi, at the sea pier, bus, train and taxi station, in the hotel lobby, fancy restaurant, or typical Serbian (Balkan) tavern, in a crowded city square, in a crowded bazaar (market), in a dimly lit alley or a museum filled with silence...

That's why she rightly concludes:

> With some of them you remain friends for the rest of your life, from others you learn wisdom that you didn't discover in the books you read, you get to know destinies, and you understand your own more clearly. In your compartment travels, getting off at one station and getting on at another, the varied and colorful life inhabit-

> ing the places you pass through. Alive and real, it escaped from scientific generalizations, from tragic or comic aestheticization and art, from its own gray everyday essence, this life is in motion, on the road, ready for meeting, for open conversation... (Bogomilova, 2020, p. 13).

Dr. Bogomilova is very modest in her evaluation of her own book:

> For my personal encounters with people from 'my' Balkans...A personal and non-committal point of view–maybe truthful, maybe not, maybe wise, maybe not, but formed not in a library or in a cabinet, but personally experienced...One subjective, not black-and-white, but a colorful 'snapshot' in the brief blink of a single barrel, changed a whole quarter of a century (Bogomilova, 2020, p. 15).

I claim enthusiastically that Nonka's book, as a personal, experience-based insight into the culture and characterology of the Balkans and the Balkan people, is destroying stereotypes and prejudices about our living space, a project which has been undertaken at a high scientific level by world-renowned Balkanologists Jovan Cvijić from Serbia and Maria Todorova from Bulgaria.

About Nonka (and Bulgarian friends)

I openly say that I am a friend of Bulgaria. I have stayed in your beautiful country many times, and have traveled from Transko, Blagoevgrad, Veliko Tarnovo, Plovdiv to Nessebar and Burgas. Of course, I also come to Sofia two or three times a year for various scientific conferences and visit acquaintances and friends. Among them:

1. Georgi Fotev, a well-known sociologist,
2. Vihren Buzov, philosopher,
3. Elena Marushiakova and Ilona Tomova, well-known in the field of Romani Studies,
4. Antonina Zhelyazkova, NGO activist,
5. Magdalena Slavkova, sociologist of religion,
6. Tzenka Ivanova, linguist and Dean of the Faculty of Philology at the University of Veliko Tarnovo, and so on.

But I have most often and closely collaborated with:

• Professor Petar-Emil Mitev, whom I consider one of the greatest Bulgarian political scientists and sociologists. We are also family friends: he has been my guest many times in Niš, at my University and in my home, as I have also been his guest;.

• Associate professor Petko Hristov, probably the most famous Bulgarian ethnologist of the middle generation in the Balkans, and even in Europe, and

• Professor Nonka Bogomilova, a leading Bulgarian philosopher and sociologist of religion, well known in every Balkan and European country.

I make it clear that I consider Nonka a friend. By friendship I refer to both the camaraderie that has been created by our acquaintance and that which was created by mutual reading of scientific works and books. I insist on the value of both equally; in terms of intensity, I do not consider our "reader-friendship" any weaker than the social friendship formed in each other's company.

From my perspective, our friendship developed as follows. First, in the early 1990s, while reading the world's leading journals in the sociology of religion, I came across her name, and read and noticed the value of her scientific works in English. Then, in 1997, I invited Nonka Bogomilova to participate in the international conference: "Ethnic and confessional relations in the Balkans." At my house, in the courtyard, I hosted an intimate dinner for the three most distinguished participants: Dr. Nonka Bogomilova, prof. Georgy Fotev, and Eileen Barker, a famous professor from the even more famous London School of Economics and Political Science. Since then, we have met many times in Bulgaria and Serbia and established a meaningful friendship and fruitful scientific cooperation. As an example of this: I have recently provided a Serbian translation of her paper, "Religion Within the Theoretical Field of Contemporary Balkan Scholars (In the Context of the Collapse of the Former Yugoslavia)," and I will print it by the end of this year in the journal, *Yearbook of Sociology*.

I am convinced that this is not the end of my cooperation and association with this intelligent and educated, hardworking and persistent, gentle and measured, honest and moral, loyal and friendly, sympathetic and beautiful woman–a real lady.

In summa

Nonka Bogomilova is, as the Serbs would say, a God-given Bulgarian and Balkan scientist in the field of religious research. With this book, she has shown and proved herself to be a true humanist who unites–not separates–the people of the Balkans. I thank her for that, and regard this final remark to be the highest compliment I can offer for her work and for the humanist message of the book, *The Balkans: Marked Roads (1991 – 2016).*

Her Balkans are also my Balkans!

References

Bogomilova N (2020) *Balkanite: belyazani patishta (1991–2016).* Sofiya: Paradigma [*The Balkans: Marked roads (1991–2016).* Sofia: Paradigma].

Book review. *After Thomas Kuhn. The Structure of Aesthetic Revolutions*, by Oana Șerban (Boston, Berlin: De Gruyter, 2022)

A theory of aesthetic validity, inspired by Thomas Kuhn

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Whoever read attentively *The Structure of Scientific Revolutions* would never guess that Thomas Kuhn might advocate for aesthetics or for tackling the possibility of translating the theoretical model of scientific revolutions into the field of cultural revolutions. And yet, we find Kuhn strikingly oriented towards the arts insofar as he addresses the possibility of applying the structure of scientific revolutions to artistic revolutions. This hypothesis appears in "Comment on the Relationship between Science and Arts," a lecture occasioned by a set of conferences that gathered art historians, historians of science, and aestheticians, domains that, at a first glance, have little in common. Oana Șerban's book deals with this Kuhnian approach of looking at artistic changes through the lens of the history of science and assumes Kuhn's unfinished project of justifying and applying this theoretical model (imported from the sciences) to the arts. Her recent editorial project was published at the end of 2022 by De Gruyter and challenges us to revisit Kuhn's contributions, a fitting task at a time when the philosophical world was celebrating the 100th anniversary of Kuhn's birth and 60th anniversary of the publication of *The Structure of Scientific Revolutions*.

I. What is new in this critical undertaking of Kuhn's theories?

There are a couple of factors that lead to new insights on this Kuhnian inheritance at the edge of science and aesthetics. At a first glance, any reader might have the impression that Șerban would adopt and focus on the Kuhnian attempt to distinguish aesthetic and scientific revolutions based on their respective ends. In science, only the final product–the discovery–counts; in the arts, we are interested in all the steps that led to the construction of an artwork. The sciences and the arts thus have a very different relationship to the matter of ends. Kuhn says that in the arts, aesthetics is itself the goal of the work. In the sciences, it is at best a tool: a criterion that may help distinguish the choice between theories which are in other respects comparable, or an inspiration to help guide the imagination seeking a key to the solution of an intractable technical puzzle. But in fact, Șerban has another purpose: reexamining Kuhn's considerations on means and ends in science and art, she observes that Kuhn made no distinction between aesthetics and art, which is exactly the main reason that he failed to successfully translate the brilliant hypothesis of the structure of scientific revolutions to the domain of the arts. In her book, Șerban strongly suggests that if we accept the Kuhnian hypothesis according to which the aesthetic appearance is the finality assumed in the realm of the arts for any product, then the implication of such a statement manifests at the level of distinguishing aesthetic revolutions from artistic ones: the former will be understood as ends of the latter. From her perspective, a paradigm shift crosses an ideological process, the artistic expression being merely a form of representation that exhibits the structures which characterize the new, dominant paradigm. This is the main reason that Șerban believes investigating the distinction between the aesthetic and the artistic within Kuhn's theory would significantly alter his argument on the similarity of artistic revolutions and scientific ones, and would therefore make this similarity more accurate, plausible, and transparently supported. So, a proper typology would include the distinctions t between aesthetic, artistic, and scientific revolutions, and this might bring to the spotlight the true nature of progress in the arts.

This point leads us to a second important outcome of this book, namely, its critical approach to two competing narratives on the nature of progress, inspired by science and the arts. Progress is a narrative about traditions and novelties embedded within a certain temporary dynamic. What I appreciated particularly in this Kuhnian model was the idea that in the arts paradigms are not incommensurable as they are in science. Picasso's success did not nullify the value of Rembrandt; still, in examining the birth of artistic revolutions, it is clear that art has not been an advocate for the preservation of tradition. On the contrary, artistic movements have often confronted tradition, and avant-garde movements are positively hostile to tradition. Structurally, avant-garde movements are reactionary movements–revolutions of negation. Kuhn develops a similar observation to highlight the fact that, in scientific progress, tradition is absorbed into the quality of new products. In art, it is either rejected or intended for preservation, according to the requirements of a corresponding ideology. Recasting this observation in Kuhn's terms, one can argue in favor of the coexistence in the arts of incommensurable or incompatible paradigms that are valid simultaneously.

Thirdly, by connecting Kuhnian ideas to the history of art, one of Șerban's intentions is to persuasively argue that paradigms and masterpieces can be understood as rational models in science and in the arts. They elicit similar behaviors from individuals who perceive scientific and artistic objects respectively. Such notions are critically discussed in the ambitious project of George Kubler, who attempted to explain under what conditions it is possible to translate the structure of scientific revolutions to the arts by treating styles as paradigms. Kubler is quite fascinating, as he blends arguments from the history of science and evolutionary biology with theories of progress specific to the realm of arts. In short, he takes an attentive look at the history of art, which is narratively based on the inner discrimination of useful and aesthetic products, later classified, as Kubler himself briefly observed, "by types, by schools and by styles." On the one hand, Kubler recovers the classical sense of "style" as a trademark for authorship, a proximate meaning of "paradigm"; on the other hand, he challenges this notion of style with the postmodern accounts of the many forms embraced by "trends." Reading his book, *The Shape of Time*, an attentive reader will be challenged by the definition he gives to style: "Style describes a specific figure in space better than a type of existence in time" (Kubler, 1962, p. 4). So, style is iconic, conventional, but authoritative.

Kubler also defends the idea that what counts in the history of art is the entrance of an artist into a paradigm. In other words, Da Vinci would have been unknown if he had been born in ancient times or in the future– a contemporary of Dali, for example. Revolutions are caused, consequently, by biographical accidents, historical entrances and cultural climates that provide durability to a style. The Kuhn-Kubler dispute concerns the possibility of claiming that styles are equivalent to paradigms. For Kubler, science offers tools while art produces masterpieces; science is driven by narrow and predictable interests rooted in material needs, while art corresponds to spiritual aspirations and cultural ambitions that strengthen the eminence of a flourishing society, welcoming talents to appear, to manifest, to "happen." Science engages itself in simplifying and conserving life, whereas art is entitled to embellish it. Kubler is also obsessed with the nature of boundaries and distinctions in the arts, considering styles as open, closed, or linked paradigms. Here, Kuhn would protest since paradigms became exhaustible because a part of them can be re-puzzled by another paradigm. So, in a sense, any paradigm becomes an open or a linked one. 'Style' and 'paradigm' are similar but not entirely interchangeable terms from the realm of art to science and vice versa despite the fact that they both behave as "symbolic expressions of historical change" and "conventional metaphors" (Kubler, 1967, p. 5) of knowledge. In Kubler's terms, style must be placed in the nutshell of the arts due to its iconic trajectories, whereas paradigms can be rightfully borrowed from science and applied in aesthetics given their epistemic and ideological potential. In fact, Kubler brings to fruition Kuhn's attempt to open the structure of scientific revolutions to art with some historical ingredients that are quite relevant to the success of this endeavor. Kuhn establishes an understanding of revolutionary patterns, but Kubler reenvisions the relationship between these patterns and the morphology of art history.

II. A debate between (post)Kuhnians and (non)Kuhnians on matters of the arts and cultural revolutions. The insufficiencies of previous theoretical models of formalizing aesthetic validity

Oana Șerban reflected on these contrasts, reaching the conclusion that only a theory on *aesthetic validity* might have the power to illuminate the conditions in which aesthetic paradigms, framed ideologically, express values, beliefs, and principles, by using artistic contents that manifest definitive styles. She also supports the theory of aesthetic validity with a subsequent theory, that of *artistic incommensurability*. Kuhn believed that the arts behave non-cumulatively since they embed so many paradigms that do not necessarily influence future ones, whereas science operates cumulatively. So, to apply this logic: Michelangelo did not influence nor determine the style of Picasso, but the discovery of ampicillin is relevant for developing different antibiotics. But in regard to the products of the two domains, this view may not actually be valid. Although Dada disregards the mimetic practices promoted by classical art, a Dadaist artist can produce his works in complete ignorance of da Vinci or Michelangelo. Da Vinci's Mona Lisa is not incommensurable with Duchamp's; rather, they coexist.

Challenged to explain the nature of progress in science and progress in arts, Șerban maintains that a linear representation is suitable for the former while a circular representation (meaning a dialectical one) works better for the latter. Concerning the theory of aesthetic validity itself, Șerban evaluates former attempts at such a critical endeavor. One of the earliest attempts was made by Hofstadter, who grounded aesthetic validity on two pillars or two validity claims: rightness and truthfulness. The former ensures the material validity of an artwork, whereas the latter secures its spiritual validity. In this context, validity is understood as adequacy of form or meaning within a dominant paradigm or social mentality at the time when the artwork is executed. However, Hofstadter's theory is incomplete as he maintains that aesthetic validity can be predicated only of artworks that are assumed to represent the Idea of Beauty. One of the intentions behind many modern art movements is to defy any standard of beauty imposed by a form of cultural authority, which leaves these artworks outside of the scope of Hofstadter's theory. Therefore, Hofstadter's theory is operable only within certain aesthetic movements.

Next in line is Clignet, a more convinced and committed Kuhnian. According to Șerban, Clignet properly understood the similarities between scientific and artistic revolutions, given their manner of introducing paradigms. Procedurally, such a process "means organizing axiological and epistemological contents into unitary discourses that can be integrated into a certain system that also depends on the social control exerted by practitioners" (Șerban, 2022, p. 168). Clignet also has the merit of presenting scientific revolutions as cumulative, with effects immediately visible among audiences, whereas artistic revolutions are contingent and noncumulative. Both science and the arts confront a realm of normal practices and some anomalies, or deviances, in which progress is made possible. Therefore, formalizing Clignet's model of artistic revolutions, Șerban distinguishes normal practices and revolutionary practices. These compose the two-fold process of aesthetic validity represented by: aesthetic validity "ideologically framed and constituted" and "artistic validity, formally and materially grounded" (Șerban, 2022, p. 177). The work of formalizing Clignet's theory of aesthetic validity has not been an easy endeavor; Șerban devotes pages of her book to formalizing this model based on: categories of objects that share aesthetic and artistic properties, cultural categories to which (in)validated objects are subjected, norms of durability, norms of recurrence and predictability for paradigm shifts, norms of axiological validation, norms of variability, norms of veridicality, norms of integration in cultural systems, practices of transgression, practices of social construction, practices of political acceptance of artworks, practices of economic orientation, forms of validating objects. Two aspects of this project are quite illuminating:

> 1. The distribution of political power inflicts aesthetic validity. 2. Aesthetic validity is grounded on ideological concerns and constraints derived from dominant political regimes that proclaim certain forms of arts being acceptable or inappropriate (Șerban, 2022, p. 180).

None of the previous attempts to understand the dynamics of aesthetic and artistic revolutions took an attentive look at the political factors capable of altering dominant paradigms and their durability, and this is one of the most innovative aspects that Șerban's research gathers.

A competing narrative on aesthetic validity appears in Habermas's *The theory of communicative action*, but it is more socially than politically oriented. Aesthetic experience, as well as any curatorial or critical discourse devoted to an artwork, abuses argumentative procedures that require a certain account of "propositional truth, normative rightness, subjective truthfulness and aesthetic harmony" (Habermas, 1987b, p. 314). In the name of this form of aesthetic rationality, Habermas conceived a theory of aesthetic validity. It addresses rightness as the adequacy of works of art as modes of knowledge for grasping the norms of corresponding aesthetic-practical knowledge and aesthetic-practical rationality. In contrast, truthfulness is considered as expressiveness. The former makes possible *disputatio*, the latter makes possible *discutatio*. So, for instance, when I say, I like the Mona Lisa, you don't have to be convinced by me–you might like it or not. That is *disputatio*. But, if we want to debate what we understand to be the beauty of the Mona Lisa, then we must be in possession of the same understanding of such a concept– beauty–and that is *discutatio*.

Șerban acknowledges the potential limitations of her own inquiry, stating:

> My analysis can easily be accused of an arbitrary selection of synthesized structural models of aesthetic validity dominated by post-1950's authors. Such a deliberate option was influenced by the thematic and methodological coherence that I had to maintain with the 'genealogical' origin of my topic, namely, the Kuhnian hypothesis of extinguishing the structure of scientific revolutions to artistic revolutions, from which the need to legitimate aesthetic validity emerged. Therefore, my project aims to frame a new philosophical context for explaining the structural differences between aesthetic and artistic revolutions and for developing the concept of aesthetic validity not without first evaluating all the previous attempts that led Kuhn's hypothesis to the ideational foundation of such a critical inquiry. Respecting the criteria suggested for a historical reconstruction of these theoretical precedents of framing aesthetic validity, I choose the most relevant sequences that created decisive argumentative turns in favor of accepting and justifying such concept: Hofstadter, Clignet, and Habermas the most engaged scholars in solving this aesthetic 'puzzled problem,' invoking a Kuhnian term (Șerban, 2022, pp. 190-191).

According to her, these thinkers all offer a theory of aesthetic validity based on rightness and truthfulness, though they are not entirely Kuhnian in their views. Clignet is by and large a Kuhnian by default, but Habermas departs widely from Kuhnian precepts. Still, each entirely embeds in their version of aesthetic validity contents inspired by modern philosophy, such as the antinomy of tastes, the rationality of the system of the arts, and the role of the Enlightenment in shaping European culture in modernity. But Șerban argues that each of these theories is incomplete, either conceptually or methodologically:

> Nevertheless, it was a general conclusion that they might engage in accepted differences between aesthetic and artistic properties of objects but they do not derive from here explicit structural differences between aesthetic revolutions and artistic revolutions; their philosophical rigor should be strengthened—sociological nuances might be dominant in some aspects of the proposed critical inquiry; and that the concreteness of a political layer incorporated in the proposed structure of aesthetic validity lacks—in fact, the politically explicit component is merely neglected, when it should have been engaged at least in what concerns the implication of political ideologies and practices in the constitution of aesthetic paradigms and the protection or prohibition of certain artistic paradigms. Consequently, the validity claims assigned to these models should be revisited in the light of these theoretical breaks (Șerban, 2022, pp. 191-192).

III. Overcoming previous competing models of aesthetic validity. Șerban's solution–a feasible one?

What we find in the following pages of this book is a critical return to Nietzsche and Foucault, which occurs the a very clever formula of engaging their philosophical methods–the genealogy and the archaeology, respectively–to exhibit the history of the arts as the history of aesthetic revolutions and their corresponding artistic movements. Șerban introduces a case-study on avant-garde movements, considered as revolutions of aesthetic and artistic knowledge, or more precisely, of aesthetic ideology and artistic expression. She looks to twentieth-century modern art using both a genealogical outlook, which critiques the revolutionary spirit of avant-garde, and an archaeological method, which closely follows the interdependencies of different artistic regimes, tracing the paradigm shifts from one revolution to another as well as their unique capacity to answer a particular social problem.

The twentieth century was characterized by experimental aesthetics and political movements, and this is why Șerban suspects to discover here the most powerful political reflexes of the culture of avant-gardism. Dada, Surrealism, Futurism, Situationism, and Pop Art are just some examples of the avant-garde movements evaluated by Șerban. Each of these she considers as dominant paradigms depending on their power to prescribe dominant criteria for the rightness and truthfulness of an artwork.

Genealogically, avant-garde movements cast aesthetic validity in terms of categorical and expressive validity. The former offers standards for observing aesthetic objects in relation to their aesthetic categories, while the latter imposes corrective interpretations of the meaning of 'artistic' "in terms of de-familiarization of traditional, conventional or standardized styles" (Șerban, 2022, p. 215). Archaeologically, avant-garde movements represent resistance because they prescribe rightness and truthfulness in terms of epistemic validity and political validity, respectively. The former offers standards for perceiving from a historical standpoint the aesthetic paradigm as an episteme or body of knowledge, while the latter offers corrective historical interpretations of the contingency and connectedness of political practices and artistic praxis. In these conditions, a genealogical framework supports an understanding of aesthetically valid actions as the result of the relationship between politics and the arts, whereas archaeology helps us identify the authority of a revolutionary paradigm whose artistic means for the transformation "of life and society are politically engaged, committed or inspiring" (Șerban, 2022, p. 216).

We are thus left with a more methodological approach to aesthetic validity. We are also left with significant findings, which Șerban considers cornerstones of the argument that paradigm shifts in aesthetics and science exhibit identical structures, the only difference between them being the nature of progress in each domain. The findings related to this argument are as follows: the proof that artistic revolutions are expressions and effects of aesthetic revolutions; the thesis that the contingency of artistic and political practices directly contributes to the authority of paradigms and their validity; and the claim that aesthetic validity is politically determined and has always to fulfill some pragmatic function. As Șerban states:

> Questioning what holds the historical and epistemic dominance of a paradigm, and by what means such an element would respect the complementarities and affinities between scientific, artistic, and aesthetic revolutionary patterns, my final answer is that the full responsibility for this is taken by the concept of validity, meant to reveal the normative, discursive, and axiological criteria that maintain the availability of paradigms and their behaviour along mechanisms of shift. Introducing the concept of aesthetic validity represented not only a great achievement in dealing with the particularities of aesthetic revolutions, but equally a powerful tool capacitated to diagnose and reveal the shift of artistic styles as direct implications of aesthetic revolutions. I argue that aesthetic revolutions are ideologically framed and prior, both ontologically and logically, to artistic revolutions (Șerban, 2022, pp. 230-231).

What I find interesting at the end of this book is the puzzle itself–to borrow a Kuhnian formula–of blending the history of science and the history of the arts through philosophical means. It is, in fact, a book about the relevance of aesthetics as a philosophical and, most importantly, autonomous field, nowadays. Of course, for someone who belongs to more analytical philosophical communities, this book is an invitation to think outside of the box and to question as much as possible the nature of interdisciplinarity in reference to the works of Thomas Kuhn. For those with quite a sharp analytical taste, a few questions might arise: is there any chance of reading the history of the evolution of artistic styles through the lens of so-called evolutionism? Is the philosophy of biology really inspiring the serial and non-serial sequences of paradigms and styles, in their chain of shifts, as Kubler argued? Can we frame an analytic orientation to aesthetics on Kuhnian grounds? While it remains difficult to respond satisfactorily to these questions, it nonetheless is a major win to be capable of addressing Kuhn's legacy on the history of the arts and aesthetics as a figure rivaling Hegel. For this reason alone this book is worthy of a devoted reading.

What would have been welcomed but did not appear in this book is a discussion of the theory of aesthetic validity in reference not just to avant-garde movements as a whole, as a revolutionary cluster, but to each particular avant-garde movement. This would have allowed for a clearer understanding of the process of paradigm shift in the arts. Given this omission, historians of art might find Șerban's book less satisfying than historians of science. But, certainly, the group that may find this book most confrontational are aestheticians, who more than ever must fight to defend the dignity of their domain, especially in an era in which art is rarely judged as an object of beauty, but rather evaluated in terms of its capacity to shock an audience. In addition, it is difficult to ascertain how Șerban could continue her project in an era in which politics is less and less about the clash of ideologies, and more and more about the simulacrum of power in a society avid for political correctness at any cost. Nonetheless, I don't think we will find a better manner of philosophically addressing the distinctions between aesthetic and artistic contents or their capacity for producing cultural revolutions than we find in Oana Șerban's exploration of aesthetic validity and its connection to the ideas of Kuhn.

References

Clignet R (1985) *The structure of artistic revolutions*. Philadelphia: University of Pennsylvania Press.

Habermas J (1987) *The theory of communicative action*, 2. Translated by Thomas McCarthy. Boston: Beacon Press.

Hofstadter A (1963) Art and spiritual validity. *Journal of Aesthetics and Art Criticism,* 22 (1): 9–19.

Kubler G (1962) *The shape of time. Remarks on the history of things*. New Haven, London: Yale University Press.

Kuhn T S (1970) *The structure of scientific revolutions*. Chicago: The University of Chicago Press.

Kuhn T S (1977) Comment on the relations of science and art. In: *The essential tension: Selected studies in scientific traditions and change*, 340–351. Chicago: The University of Chicago Press.

Kuhn T S (1977) *The essential tension: Selected studies in scientific tradition and change*. Chicago: The University of Chicago Press.

Șerban O (2022) *After Thomas Kuhn. The structure of aesthetic revolutions*. Boston, Berlin: De Gruyter.