



The Human in Machine-Made Art

Jérémie Queyras

art.queyras@gmail.com

Paris College of Art, Paris, France

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The question if machines can make art has existed since before the industrial revolution. This research aims to clarify if this goal is attainable by comparing two case studies: *Méta-Matic No. 10*, a machine built by Jean Tinguely in 1959, and Ai-Da Robot, an ultra-realistic robot using Artificial Intelligence, invented in 2019. Both machines were built with similar intentions. This research demonstrates how the low-tech aspect of the former case study facilitates its status as an art-creating entity compared to its latter code-reliant counterpart. Furthermore, this research addresses questions surrounding authorship, creativity and embodiment and examines to which degree each of these aspects is relevant to a claim of machine-made art.

Keywords: Machine, Artificial Intelligence, Art Production, Philosophy, Creativity.

1. Introduction

The ability of humans to delegate tasks to machines has given rise to the question of whether machines could also make art in their own right. This paper takes a precise look at two machines which through their technological capabilities take on the role of the artist: Jean Tinguely's *Méta-Matic no. 10*,¹ a drawing machine from 1959 and Aidan Meller's Ai-Da Robot,² which was completed sixty years later in 2019. They both operate on the same principle of supposedly creating artworks free from human agency. Tinguely's machine draws random abstract paintings within the limits of its machinery. Ai-Da uses Artificial Intelligence (AI) to absorb her environment and paints in response to it, producing both abstract and figurative paintings. Tinguely created his *Méta-Matic No. 10* as an attempt to dispel the idea that only humans could make art. The machine, which is presented on a pedestal requires the viewer to attach a piece of paper to its drawing board and insert a pen into its mechanical arm. Once all of the materials are in place, the viewer presses a button, upon which the machine starts drawing frantically, without any coordination or plan. *Méta-Matic No. 10* was an attempt by Tinguely to demystify the idea of the "artistic genius" and cult of personality, which was particularly prevalent at the time around artists such as Jackson Pollock or Pablo Picasso. The message was clear: If a human can do it, so can a machine (Bürgi 2008). Sixty years after Tinguely created *Méta-Matic no. 10*, in 2019, Aidan Meller's idea of a humanoid robot using Artificial Intelligence to create artworks, became a reality. A team of engineers from Engineered Arts, a company based in Oxford, United Kingdom worked with Salah El Abd and Ziad Abass, to complete this robot, whose only purpose is to record the world and to create art (Meller 2019). Ai-Da (2020) draws her³ inspirations from various sources as she explains in a "TEDx Oxford" talk which was given in February 2020. Examining these two seemingly unrelated creations makes it clear that today, the question remains: Can machines make art?

As Philip Galanter (2016) notes in his essay *Generative Art Theory*: "To date there is, of course, an artist behind the scenes, creating the situation that allows the computer to act this way. Nevertheless, the relative independence of the computer is perceived as being qualitatively different from the characteristics of other tools in art history" (p. 168). As machines and AI become more important factors in the international art market, this paper suggests that questions regarding the creativity of machines have to be continuously addressed in depth. As Harsha Gangadharbatla (2022) notes in *The Role of AI Attri-*

1. Also referred to as "Méta-Matic" in the context of this research.

2. Also referred to as "Ai-Da" in the context of this research.

3. This paper uses the female pronouns she/her for this machine, based on press releases and international coverage, as well as the observed use of those pronouns on the official Ai-Da website.

bution Knowledge in the Evaluation of Artwork: “Findings suggest that individuals are unable to accurately identify AI-generated artwork” (p. 1). Faced with a drawing created by *Méta-Matic No. 10* or Ai-Da in comparison to human-made art, it is likely that participants will not be able to distinguish whether it was human or machine-made. This presents humans with a crucial question, regarding the future of art and its dependence on human involvement. This thorough analysis aims to determine if objects which result from a purely mechanical or electrical process can be deemed artworks in the twenty-first-century human conception of art.

2. Art-Machines

2.1. Art-Making Machines and Beyond

In his article entitled *Jean Tinguely: Méta-Matic Nr. 10*, Andres Pardey (2001) describes the public’s reactions the first time Tinguely’s drawing machines were presented in an exhibition which took place in July of 1959 at the Galerie Iris Clert in Paris: “Approving and disapproving reviews can be read in the press, the beginning of a new age of art or even the end of painting is invoked, the uproar is complete” (p. 46). We learn that painters at the time may have worried as to the efficacy of these drawing machines, yet felt reassured as to the necessity of human intervention even with abstract painting (Pardey 2001). Furthermore, Pardey illustrates how at the time all drawings produced by *Méta-Matic No. 10* were dated and signed by Tinguely, *Méta-Matic*, and the person activating the drawing process. The article also sheds light on the technicalities of the formalisation in patenting his machines as *Machine made to draw and to paint*⁴ under the patent number 1.237.934 with the French Ministry of Industry. Pardey (2001) concludes with a comparison of *Méta-Matic No. 10* to Duchamp’s Ready-made artworks (a series of works in which Duchamp modified ordinary manufactured objects in a mostly “non-useful” way, thus making them objects of contemplation and declaring them art) stating that they both: “not only concretely refer to reality, but also at the same time create it” (p. 48). The classification of the machine as *Machine made to draw and to paint* and the idea of collaboration with *Méta-Matic No. 10*, as is implied by the way the resulting artworks were signed by Tinguely, the user and the machine, suggest that the role of the machine is equal to those of the humans. However, the question arises in the twenty-first century, after Tinguely’s death, whether the machine fills the void of the artist. If the artist, who made the machine which makes the paintings could lay claim to those artworks during his lifetime to a certain extent is not alive anymore, are paintings created by *Méta-Matic No. 10* the machines artworks alone? Is Tinguely still producing art from his grave, so to speak, every time someone activates *Méta-Matic No. 10*?

To understand why this research is comparing a machine from 1959 to a humanoid robot which uses artificial intelligence in 2023, we must turn to Brian Reffin Smith, author of the article *Beyond Computer Art*. In this article, Smith (1989) argues that computers should be tools for artists, a means to an end, rather than an end in themselves; noting at the time that: “Images are celebrated and justified just because they were done with a computer” (p. 40). This, Smith suggests, is an explanation of the divide between so-called “computer art” and the rest of the art world at the time, as computer art occupied itself mainly with its very tool of production. Smith (1989) makes a strong case for the irrelevance of the computational power of a machine: “A good idea will be good even if realised on a cheap computer, using a bad printer, monitor or graph-plotter as output. A bad idea will remain bad, even when portrayed on a million-colour ultra-high-resolution display” (p. 41). Smith (1989) ends with a plea to use computers as tools to create art which is not concerned with the way it came into existence but has a “higher” purpose, one which: “Walter Benjamin would have loved, that Wittgenstein would have appreciated, that would have turned Descartes into a Holist. Let us make an art that does not need the computer to justify it” (p. 41).

The question of computational power is non-existent with regard to *Méta-Matic No. 10*, which raises the question of why humans are so keen to produce more powerful, more intelligent machines, in hope of making them independent art-makers. More computational power is not needed to make a machine draw or paint, Tinguely already proved that. It is only needed to make a machine draw or paint very specific things. In other words, the code is the imposition of the human will and its parameters onto the machine. It is our insertion into its electrical circuits. This gets to the heart of one of the hypotheses this research examines: whether *Meta-Matic No. 10* has an advantage over programable machines due to its un-programmability, in other words, a certain kind of freedom. Thus, the question arises, whether these limitations of code, to an aesthetic or logic which can be understood by us humans, also apply to AI. AI could be understood as the attempt to teach the machine to free the code from its parameters: the code which humans have imposed is changed by the machine itself. This could be understood as the act by the machine, of teaching itself new things. The machine is thus altering the very fabric which allows it to apply logic. Although, during the beginnings of machinic emancipation, creators such as Stephen Wilson (1983) noted in *AI and the Arts* that: “In creating an AI program, one must make a choice about the characteristics of a mentality one wishes to program” (p. 15). Perhaps, *Méta-Matic’s* abstract, random drawings, operate under some universal random distribution function, which would embed in them a certain kind of logic, although not consciously perceived by humans as such. Contrary to that, Ai-Da still creates artworks, which can easily be read and understood by humans because they are created using a “language” of figuration

or abstraction which Ai-Da has been taught, to resemble human art. While Tinguely and the human putting pen and paper into place for *Méta-Matic No. 10* play the role of enablers of the creative process, humans are much more involved in the creation of artworks by machines using AI, at least in the initial stages. Similarly, to Wilson's observations on the choices one faces when programming AI machines, the creators of the AI artist have to choose which kind of art will result from the machine. Therefore, human input is irreversibly linked to the final outcome. In artist robots using AI, humans want to create machines that make art independently, but in a format which we know and which is recognisable to us, as exemplified by Ai-Da (Dinis Guarda 2020). Whereas true machine creativity is more likely to result in something which is not understood by humans as art, i.e. code (GPT-3 2021). By restricting the liberty of the machine (by setting parameters, and commands in the form of code), we tend to take away its freedom, its agency. This fundamental paradox was already observed in 1981 by Peter Kugel in his essay *AI and Visual Art*. Kugel (1981) recognizes that: "Computers can apply rules as well as, and sometimes better than, a human. What computers at present do badly is formulate the rules to be applied" (p. 139). Perhaps, the moment AI will be truly creative will be defined by the moment a computer can formulate a rule and break it voluntarily out of its own "desire". Each great progress in art history has been defined by great thinkers who were able to identify (unwritten) rules and consciously break them, turn them upside down, or flat-out ignore them (Du Sautoy 2019).

On the other hand, it has been claimed that the capability of AI or for that matter any machine or living thing to make art, is determined by the recipient of the work, in the case of visual arts, the viewer. As Harsha Gangadharbatla (2022) found in his study: "Findings suggest that individuals are unable to accurately identify AI-generated artwork and they are likely to associate representational art to humans and abstract art to machines" (p. 1). Furthermore, in an article entitled *ARTificiality, Künstliche Intelligenz, Kreativität und Kunst* Pamela C. Scorzin (2021) notes that, if nothing else, the market has already had its say in the matter. She observes that art made by humanoid robots using AI such as Ai-Da has already sold for sums that most living artists could only dream of and, more importantly, has been welcomed and exhibited in those institutions which are path-breaking for the importance and relevance of creators, such as the Tate Modern, the Design Museum, and the Victoria and Albert Museum.

2.2. Authorship

The acceptance of art in itself must first be done by the author or artist, argues Karen E. Gover in her 2018 book *Art and Authorship: Moral Rights and Meaning in Contemporary Visual Art*. She con-

cludes that the realisation of an artwork consists of two moments – the moment of production and conception and the moment of proclamation:

The robust conception of authorship, which is the (often unarticulated and unexamined) norm, entails the first-order intention to generate an artwork and the second-order intention to accept the artwork that was made as good enough. I have linked this necessary second moment of ratification or endorsement to the concept of artistic freedom. Artistic freedom can mean different things depending on the context in which it is invoked. I maintain, however, that the most fundamental form of artistic freedom involves the artist's authority to accept or disavow the works she produces, to curate the works that bear her name and come to represent her artistic oeuvre. (Gover 2018, 161)

This brings us back to our two case studies: *Méta-Matic No. 10* and Ai-Da. In the case of Tinguely's *Méta-Matic* machine, the process of completion through the enunciation of the artwork by the artist is not possible or is rather passed on to the activator of the machine, who can accept or reject the work. However, even here questions of authority could be raised: who permitted this human to proclaim the work by the machine as art? It is the machine and only the machine which can make that decision as the creator of the work, some would argue. Taking research into the direction of authority and authorship with regard to creativity in the case of *Méta-Matic No. 10* brings us soon enough to a dead-end. In the case of Ai-Da, however, the question arises whether the machine is picky about her work due to her capability of communicating through her language model. Or, is it still up to the human creators of Ai-Da to proclaim her work as art? The answer to this question may be found in the application of CANS (Creative Antagonistic Networks) or GANS (Generative Antagonistic Networks), which are AI machines consisting of several artificial neuronal networks which compete with each other (Scorzin 2021). While one creates a work, the other judges how close it is to that of a human (who sets these parameters to begin with is another question). At each step, the *creator*-machine registers the positive or negative feedback from the *judge*-machine and learns not to make the same "mistakes" again. Does this fulfil Gover's (2018) requirements of the "fundamental form of artistic freedom [that] involves the artist's authority to accept or disavow the works" (p. 161)? Is that not exactly what GANS or CANS do? They make judgement calls; they decide if the work is to be accepted or disavowed. In an interview given to the Arts journal for their special issue entitled *The Machine as Artist (in the 20th Century)*, artist Leonel Moura (2018) gave this insight into his relationship with the artworks created by his machines:

The algorithm and the basic rules introduced thereby via the robot microchip are not so very different, furthermore, from education. No one will claim that a given novel is the product of the author's school teacher. To the extent that the author, human or machine, incorporates new information, the artwork becomes not only unique but also the result of the author's own creativity. In short, I teach the robots how to paint, but afterward, it is not my doing. (p. 4)

It is interesting to note that Moura's artbots are something between *Meta-Matic No. 10* and Ai-Da. They use code, as they operate with sensors to detect colour and density on the surface beneath them and lower or lift a pen in response to what they detect. Several artbots, operating at the same time, have sensors to avoid bumping into each other or other kinds of obstacles. They thus have an interaction with their environment which is also based on sensor input. While a human could physically intervene in *Meta-Matic No. 10's* process by holding a moving part or exerting pressure on some of its metal parts during the process, these artbots are programmed to "read" their environment and react to it. Their drawings are random within the boundaries of their environment. However, contrary to Ai-Da, they are not programmed to paint what they perceive. Their artworks result from their movement in a given space and look like abstract line drawings which resemble more *Méta-Matic No. 10's* scribbles than Ai-Da's calculated abstract or figurative paintings. Moura (2018) further claims that: "Whether a work of art is made directly by a human artist or is the product of any other type of process is nowadays of no relevance" (p. 4). This research posits that there is a case to be made that Moura may be right, yet only in part.

2.3. The Post-Humanist Era

A very important book about a topic so close to this research is *AI Art: Machine Visions and Warped Dreams* by Joanna Zylińska, published in 2020. In her book, Zylińska addresses many issues surrounding machine-made art including when she speaks about the *Artistes & Robots* exhibition at the Grand Palais in Paris in 2018, in which coincidentally another drawing machine by Jean Tinguely, *Méta-Matic No. 6* (a machine almost identical to *Méta-Matic No. 10*) was exhibited. Discussing various art-making machines exhibited at this exhibition, Zylińska (2020) notes: "Naturally, artists do not construct these machines just to get 'help' but rather to probe the limits of the human idea of creativity and of human-machinic assemblages. These works are thus described as collaborations between the artists and the robotic systems those artists have designed" (p. 58). Thus, Zylińska recognises that these machines ought to be discussed as more than just tools. Building on the work of philosopher of technology Vilém Flusser, Zylińska observes that the notion of machines made by humans being read as separate forces is reductive

and an old-fashioned view of human-machine relationships. She suggests that since the advent of computer technology at the latest, humans have evolved with machines and machines have evolved with humans. Furthermore, Zylinska states that a new perspective is required to make sense of art-making machines which would view humans as just a part of a larger system of cause-effect relationships between animate and inanimate matter: “Humans’ everyday functioning also depends on the execution of a programme: a sequence of possibilities enabled by various couplings of adenine, cytosine, guanine, and thymine, i.e. DNA” (p. 53). However, she recognises that it is important not to disavow the human as the creator of any agency and thus, responsibility: “This proposition should not be taken as a postulation of a mindless technological or biological determinism that would remove from humans any possibility of action as artists, critics or spectators – and any responsibility for the actions we take” (p. 53). She goes on to highlight that humans’ dependence on natural processes beyond our control “does undermine the humanist parameters of the debate about creativity, art and AI” (p. 53). This research suggests that, by trying to demonstrate that machinic autonomy does not exist because of humans’ desire but as a naturally evolved attribute, Zylinska highlights just that: the dependence of machines on humans. The debate is thus still revolving around power dynamics. Is the machine at the mercy of the human? Or is the human at the mercy of the machine? Or is it just merry collaboration on an equal playing field? Zylinska notes that: “The human’s relationship with technology is not one of enslavement, even if Flusser does raise serious questions for the humanist notion of agency” (p. 54). However, to address questions of human involvement in machine-made art, Zylinska shifts the question from power as a dependence of one thing on another, to autonomy as a free agent in the world. The claim is that there is no autonomy of the human which sets it apart from the machine, it is one of removal of agency from the human. One of the conclusions Zylinska infers from her observations of art-making machines is that the notions these machines are addressing – namely the old “Is art a human enterprise?”, “Can machines be creative?” – are about a humanistic vision of art and thus may be misguided:

To understand how humans can operate within the constraints of the apparatus that is part of us becomes a new urgent task for a (much needed) post-humanist art history and art theory. In this new paradigm for understanding art, the human would be conceived as part of the machine, dispositive or technical system – and not its inventor, owner and ruler. A post-humanist art history would see instead all art works ... as having been produced by human artists in an assembly with a plethora of non-human agents: drives, impulses, viruses, drugs, various organic and nonorganic substances and devices, as well as all sorts of

networks — from mycelium through to the internet. (Zylinska 2020, 54-55)

Even if Zylinska says that she does not want to remove responsibility from the human, that is de facto the conclusion which is drawn from this passage. She does not address how the human could possibly retain agency or autonomy in such a view on the production of art. Granted, Zylinska does not claim that in this view humans would play no role at all in the production of art. However, it is clear that the human is, from such a perspective, not to be seen as an initiator, inventor, or author. If the idea is that the importance of humans in the art process shrinks (i.e., the human becomes only a channel for something which happens naturally), it could be conceived that art is a natural phenomenon, which appears or happens here and there, like a drop of rain, a gust of wind, just a result of certain circumstances being met at the right time and in the right place. Nevertheless, even by this definition, the human stands out in a central role. If artworks are seen by the post-humanist as having been “produced by human artists in an assembly with a plethora of nonhuman agents” (Zylinska 2020, 54), we must ask how this places the human in a less prominent position than in the humanist view on art-production. This research posits that Zylinska’s observations reframe the question of artistic production by trying to see the human as part of a whole larger universal process, which comes back to observing the mere fact that: yes, artists make art in the universe they were born into and with the world which happens to be at their disposal. This observation, however, brings us back to square one, as it is within those given circumstances that human artists are attempting to make machines which make art independently. This research thus suggests that both case studies have to be observed up close and experienced fully and naively, as the art-making machines that they were built to be by humans. This is necessary to discuss any further possibility of human involvement in their art-making process and to determine the degree to which humans play a role.

2.4. Embodiment and Power

With regard to Machine-Human or Human-Machine interaction and the relationship between humans and art-creating machines, the question of power dynamics, which is also addressed by Zylinska plays a role in the interaction between both case studies and their human operators. While the machine is at the mercy of the human in terms of the energy supply (Pardey 2022), both Ai-Da and Méta-Matic were created to make them independent from humans to a certain degree. In his paper entitled *Bodies in Electronic Space, Models for Humans and Interactive*,⁵ Peter Purg (2004) argues that bodies

5. From the German: *Systems Körper im elektronischen Raum, Modelle für Menschen und interaktive Systeme*.

in the electronic sphere are stripped of their inherent ontological function and advocates to reinstate the human body in its own space. Before AI became mainstream, Purg raises the question of power not only between humans and machines, but between software and hardware, between the digital and the electronic. In the meantime, it has become apparent that the electronic is indeed subjugated and at the mercy of the digital in almost all places where humans encounter it. *Méta-Matic No. 10* is fascinating in comparison to Ai-Da Robot, precisely because it is purely electric. It transforms one form of energy into another, and by doing so, makes art — with a little human intervention. Ai-Da, however, has in her physicality, no autonomy. The code which “runs” her, is prime. Thus, we must ask what it means for a human to interact with Ai-Da. Is the human interacting with the code or with the physical machine before it? Purg (2004) furthermore raises questions about human awareness in the process of interaction with machines. When a human feels like she or he is interacting with technology, often the human is just reacting to technology: “Especially in the interdisciplinary field of encounter between (dance or stage) art, (communication and media) science and interactive (media) technology, a collective myth of cooperativity seems to replace the individual Renaissance myth” (p. 343). This collective myth of cooperativity is just one part of a larger narrative of machine independence which is deeply rooted in mystification. This is relevant for both case studies as the question of human relevance in this research is closely tied to the relevance of the human body for the art-making process. Both case studies have either set parameters according to which they create art or, in the case of Ai-Da, have systems which enable them to generate visual imagery. Therefore, the more pertinent question which arises is not what the human mind is bringing to the equation, but what the human body has — that no machine can make art without it.

3. Originality, Novelty and Creativity

3.1. Mechanical Reproduction and Originality

In 1936, Walter Benjamin observed what he considered to be the democratising effect of the reproduction of two-dimensional artworks through photography in his essay *The Work of Art in the Age of Mechanical Reproduction*. In this essay, Benjamin posits that the end of art as an object of cult or veneration comes with the ability to reproduce any artwork in a photograph. He claims that this mechanical reproduction robs the work of its “aura” (Benjamin 1996). It is important to note that Benjamin emphasises *mechanical* reproduction, rather than reproduction in general through, for example, human labour, which had existed for many centuries before Benjamin wrote his essay. This is, of course, of great significance as Benjamin’s observation seems to conversely signify the human touch, rendering even a copy of an already existing painting somehow unique. Benja-

min makes a direct link between *machinic* reproduction and a loss of the spiritual aspect of art. Benjamin's observations are twofold: Considering the case studies of this paper we must extend Benjamin's question from the one of mechanical *re-production* to the one of the mechanical *production* of artworks. What happens if the machine does not *re-produce* but instead actually *produces* the art? Is the aura of the original dependent on the fact that the artwork is manmade, or is it because it was the original artwork? In the former case, this would render anything made by any of the case studies, not worthy of the label of artwork. In the latter case, there would be a chance for the original artworks created by *Méta-Matic No. 10* and Ai-Da to be considered artworks in their own right.

The word "original" is a difficult term to define. However, it plays a major role in the discussion surrounding art made by machines. For it is originality, that humans so often assign to humans. For this research, the role of originality in art will be examined with regard to creativity as a necessary attribute. When claims of creativity are made about AI, it is often linked to the desire to demonstrate its ability to make something original. In an article published by the BBC entitled *How Modern Art Became Trapped by its Urge to Shock* Sir Roger Scruton (2014), philosopher and professor of aesthetics at Oxford, argues that the recognition of originality as a driver for innovation and discovery in art is one of the reasons for the emergence of modernism. Whether the rise of technologies and machines is directly linked to this momentous break in art history remains to be proven. However, this research suggests that it is no coincidence that Benjamin's observations came at a time in which artists were fundamentally rethinking what it was to be an artist in a fast-changing society. Scruton makes the following observations about originality:

With the decline of religion during the 19th century there came about a new kind of faking. The romantic poets and painters turned their backs on religion and sought salvation through art. They believed in the genius of the artist, endowed with a special capacity to transcend the human condition in creative ways, breaking all the rules in order to achieve a new order of experience. Art became an avenue to the transcendental, the gateway to a higher kind of knowledge. Originality therefore became the test that distinguishes true from fake art. (Scruton 2014, 1)

These observations are not dissimilar to those made by Benjamin, who noted the origins of art in the sacrosanct and religious quests of humans. It is important to note that the perception of art in a twenty-first-century western society has undergone dramatic shifts, precisely because of technological developments. Scruton (2014) uses Marcel Duchamp's famous urinal as an example of a work of art which is considered art because of its original gesture. The point is that it cannot be repeated, it cannot be reproduced, as any attempt

to do so would not be original. This is one explanation for the rise of Modernism and the expectation from art, to be original i.e., unreproducible, not only by machines but by other humans. The determining factor for originality is thus the gesture, not the production of a thing.

3.2. Art or Creativity?

When the rise of machines is proclaimed, it is often closely linked to the advancement of AI and its growing capabilities with regard to creativity (Schwab 2019). Consequently, humans' collective gaze turns towards the arts and experts see the end of human singularity in a drawing made by a machine somewhere in Oxford (Paju 2022). However, rarely is the question addressed whether creativity in itself is what is required to create art. Even in articles discussing art made with the help of AI, journalists and experts on the topic discuss creativity fervently but fail to address its relevance for the production of art.

In his book *The Creativity Code: Art and Innovation in the Age of AI* (2019), Marcus Du Sautoy proposes a challenge in the form of a test that any artificial intelligence must pass, if it wants to be called "creative". He calls this the "Lovelace Test". According to Du Sautoy (2019), any machine, to be deemed creative, must come up with something new, surprising and of value. This triad of conditions for creativity was first articulated by Margaret Boden in her book *The Creative Mind: Myths and Mechanisms* in 1990. In the introduction, she proposes the following definition:

Creativity is the ability to come up with ideas or artefacts that are *new*, *surprising*, and *valuable*. "Ideas," here, includes concepts, poems, musical compositions, scientific theories, cooking recipes, choreography, jokes ... creativity enters into virtually every aspect of life. It's not a special "faculty," but an aspect of human intelligence in general. (Boden 2016, 1)

There are three types of creativity which Boden defines: *Combinational Creativity*, *Exploratory Creativity* and *Transformational Creativity*. It is, however, Combinational Creativity that Du Sautoy and Boden deem to be the most challenging to AI. Boden summarises this type of creativity as a method of "taking ideas that are familiar and putting them together in unfamiliar ways" (Hay Levels 2017). But why would creativity be relevant for the production of art? Perhaps, the common association of art and creativity stems from the common etymological roots of the words *create* and *creativity* (Etymonline 2021). In fact, making art always involves creating something new, be it an idea, a movement, or a painting. However, this does not necessarily mean that creativity alone suffices to make the result a work of art.

The reason this research preoccupies itself with creativity is that it is a large part of the claim that Ai-Da can be called an artist. Meller claims that she is creative according to Boden's definition of creativity (Dinis Guarda 2020). This research argues that, while this claim of creativity may be true, it is not what classifies the outcome of Ai-Da's processes as art. Boden's definition of creativity only gets us so far in determining whether machines could make art independently from humans. Her definition of creativity as something new, surprising and of value, holds true more in any other domain, than in the field of art. Is a child creating something new, surprising and of value when it draws its first scribbly painting? Not for society perhaps. But for itself, probably. Although Kelly (2019) would beg to differ: "A toddler at the piano may hit a novel sequence of notes, but they're not, in any meaningful sense, creative" (p. 1). *Méta-Matic No. 10's* drawings are not the result of a creative act by Boden's definition. However, they are considered to be art (Pardey 2022).

4. Conclusion

The main difference between the case studies of this research is in the use of the body which they inhabit and the human body which they require as a collaborator. *Méta-Matic No. 10* is nothing but its body and is at the mercy of its physiognomy. Ai-Da is trapped in her brain and can process information that she receives through her cameras. However, the process is a one-way street. While her body allows her to accomplish certain tasks, while she can record her environment through her eye cameras, any knowledge or action is initiated in her computer at the behest of humans. Unlike humans, who are constantly reacting to their environments and do things as a consequence of their environment. All the knowledge Ai-Da is referencing in her work has been produced by humans through their bodily interactions with the world. At the fundamental level, humans do create art out of necessity, which is why, until a machine needs to produce something artistic to sustain its existence, there will not be a purely machine-made artwork.

This research concludes that the claim to originality has no bearing on the status of a machine-made object as art. Therefore, this research wishes to extend Benjamin's claim beyond the mechanical *re-production* of art and to the mechanical *production* of art. The mere existence of both case studies is questioning what art can be if it is not made by humans. Thus, any person standing before *Méta-Matic No. 10* or Ai-Da may end up asking themselves: "What is it, that I as a human being can do, to make art?" Pushing the limits of machine creativity and machine-made art, does necessarily raise questions with regard to the origin of art in humans. They (the machines) were built to make art, but do not necessarily succeed. We (the humans) were not built to make art but we do it without hesitation. This research concludes that while the human body is essential

to the process of these machines, the human mind plays an imperative role. It is the human disposition towards these machines which is precisely why what they make can and should be considered art. It is at the same time cause and effect. The purely machine-made artwork has therefore, paradoxically, never existed and never will without a human.

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