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Creativity in the Light of AI

Edited by
Fabio Fossa, Caterina Moruzzi, Mario Verdicchio

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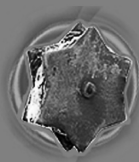
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Creating Art with AI

Claire Anscomb

Abstract

Computers appear to be working more autonomously than ever before to generate visual outputs, thanks to recent advances in Artificial Intelligence (AI). Some humans have exhibited these products as artworks and given sole credit to these systems as the creators of them. Furthermore, human audiences who are unaware of the AI origins of the works have rated them higher than those produced by humans. Although these newer systems look creative in these cases, this impression is not enough to establish that the AIs are *artistically* creative. In this paper, I examine whether such AIs meet the conditions that would qualify them as creative agents and what the repercussions are of taking monist and pluralist conceptions of artistic value on the kind and share of credit that we grant an AI for its contribution to a work of visual art.

1. Introduction

In recent years, increasingly advanced applications of Artificial Intelligence (AI) have been incorporated into the practice of computer-generated art.¹ As a result, computers appear to be working more autonomously than ever before in generating works that are appreciated as art.² In particular, thanks to developments in machine learning and computer vision (where a computer is able to process, analyse, and make sense of visual data - one of the most challenging aspects of the development of AI³) a whole host of new visual works have been generated by AIs, that have surprised even those who developed the systems. Some developers have, as a result, given sole credit to these systems as the creators of these works as artworks.⁴ Moreover, human audiences who are unaware of the AI origins of the works have, in experiments, rated the images higher than those produced by human artists.⁵ Although these newer systems look creative in these cases, these impressions are not sufficient to establish that the AIs should be credited as the creators of these works. Accordingly, I examine whether such AIs meet the conditions that would qualify them as creative agents.

Crucially, while it is generally said that agential creativity concerns the production of artefacts or

1 Boden and Edmonds (2019), pp. 33-35.

2 McCormack, Gifford, and Hutchings (2019), p. 6.

3 Du Sautoy (2019), pp. 70-80.

4 Elgammal (2018).

5 Elgammal *et al.* (2017), p. 18.

states that are both novel and valuable, we need not understand the latter in terms of something being valuable period. As Berys Gaut has proposed, instead we can take this to mean the production of something that is valuable of its kind.⁶ In the cases under discussion, our concerns pertain to the production of new artefacts that possess artistic value, and so to the attribution of *artistic* creativity. Given that we are not yet at the stage where an AI can formulate intentions and so exercise knowledge-how and an evaluative ability directed to the task at hand, I argue that AI agents cannot be artistically creative.⁷ Nevertheless, while dependent on the goals of humans who can qualify as creative agents, an AI may work iteratively without human intervention to non-accidentally generate the formal features of an image, and thus contribute to the realisation of some of the salient properties of a work. Importantly, as I demonstrate, it might be appreciatively relevant to grant an AI some share of production credit for its contribution to a work *qua* art, but what amount will depend upon the conception of artistic value we take. There is however, disagreement among theorists pertaining to what artistic value consists of.

I show that, in its present state, on a monist conception of artistic value as aesthetic value, an AI arguably deserves a greater share of the production credit for an artwork relative to that which it might deserve on a pluralist conception due to the fact that,

6 Gaut (2018), p. 128.

7 I will follow Boden in defining an AI agent as “a self-contained (“autonomous”) procedure” (2016, p. 45).

in the former case, it contributes a greater proportion of the relevant properties that the value of the work depends on. This, I argue, is also reflective of the fact that, should it become possible for AIs to have states like intentions, it would be easier for them to count as artistically creative according to a monist conception of artistic value as on a pluralist conception, whereby artistic value is a composite value, there might be multiple, quite different types, of criteria that it must simultaneously meet. In either case, there is strong evidence to suggest that AI agents can realise formal properties distinctively of the ways in which human agents can and so potentially enhance the value of a human creative agent's artistic project. Indeed, as I find, through a series of case studies, AI agents neither compete with, nor replace, but open up new opportunities for human artistic creativity.⁸

2. Artificial Intelligence and Art Generation

Over the past fifty years, a variety of computer programs have been written to generate visual works of art. An early example is AARON, which was written by Harold Cohen in 1973. Cohen wrote the initial program to produce a series of simple line drawings, based on a small set of rules and forms, which were drawn by a robot with a marker pen. However, as Cohen improved the program over time, adding more rules and forms, the output of

⁸ Jeon *et al.* (2019), p. 116; Edmonds (2018), p. 6; McCormack *et al.* (2014), p. 135.

the system evolved into colourful, figurative works, drawn by robotic arms. Notably, while AARON generated the works, these outputs were dependent upon the rules specified by Cohen. As a result, Cohen described his relationship to AARON in terms of the relationship between Renaissance painters and their studio assistants.⁹ However, in recent years advances in machine learning and computer vision have been incorporated into the practice of computer-generated art, so that computers appear to be working more autonomously than ever before in producing images.

One of the key drivers behind this was the innovation of Generative Adversarial Networks (GANs) in 2014 by computer scientist Ian Goodfellow and his team. These systems are ‘adversarial’ given their two sub networks: a generator and a discriminator. The algorithm is fed a collection of images, a training set, which only the discriminator has access to. Meanwhile, the generator starts producing random images in order to produce images similar to the training set. The discriminator then tries to discriminate between the images produced by the generator and the images from the training set. The discriminator sends a signal to the generator to indicate whether it has found them to be real or fake. Ultimately, “at equilibrium the discriminator should not be able to tell the difference between the images generated by the generator and the actual images in the training set, hence the generator succeeds in generating images that come from the same

⁹ Garcia (2016).

distribution as the training set.”¹⁰

The use of GANs in computer-generated art practice has received a lot of attention. For instance, in 2018 Christie’s claimed to be the first auction house to offer a work of art “created by an algorithm”.¹¹ *The Portrait of Edmond Belamy* was the product of The Obvious Art Collective (Gauthier Vernier, Pierre Fautrel and Hugo Caselles-Dupre), who used a portrait GAN that was trained on a database of 15,000 14th-20th century portraits.¹² When the auction hammer fell, it went for \$432,000 - nearly 45 times the estimate. Controversially, the developer behind the portrait GAN, Robbie Barrat, did not receive any credit or remuneration, while, provocatively, the work was ‘signed’ with a segment of the algorithm’s code. Despite Christie’s bold proclamations that the work is “not the product of a human mind”, as many have pointed out, the process to create this kind of image still requires a lot of human input.¹³

A human agent needs to write the algorithm which, granted, in the case of GANs, is not an algorithm to follow a strict set of rules, but to analyse a large number of images to ‘recognise’ and classify them according to the elements they contain. As we have seen, given the feedback from the discriminator, the system can ‘learn’ and modify its approach. Nevertheless, as a number of theorists have highlighted, it is important to note that such

¹⁰ Elgammal *et al.* (2017), p. 5.

¹¹ Christie’s (2018).

¹² Contreras-Koterbay (2019), p. 108.

¹³ Manovich (2019); McCormack, Gifford, and Hutchings (2019), p. 6.

machine ‘learning’ is not like human learning.¹⁴ Rather, this term “refers to the automatic adjustment of parameters so as to produce the correct output for a given input.”¹⁵ Instead of forming knowledge about art and art-making themselves, as Steinert suggests, such machines *embody* knowledge about these areas.¹⁶ Indeed, it is human agents who must choose the collection of images to feed the algorithm¹⁷ – a step in the process that Marian Mazzone and Ahmed Elgammal have referred to as “pre-curation.”¹⁸ Furthermore, while the GAN is selective about the output, it is generally a human agent who sifts through the output images to determine which of those they will use - a stage the pair have referred to as “post-curation.”¹⁹

As in the case of the *Portrait of Edmond Belamy*, some GANs are produced to facilitate the generation of images conditioned on particular categories or styles of art. Yet, as Elgammal (director of the Art and Artificial Intelligence Laboratory at Rutgers University) and his colleagues have highlighted, artists do not typically try to emulate such historical styles, “unless doing so ironically.”²⁰ Thus, to broaden the creative scope of adversarial networks, Elgammal and his colleagues produced what they term AICAN, which uses a variant of GAN, a Creative Adversarial Network (CAN). To simulate “the process of how

14 Hertzmann (2018), p. 12; Hagendorff and Wezel (2020), p. 362.

15 Ch’Ng (2019), p. 2.

16 Steinert (2017), p. 278.

17 Ch’Ng (2019), p. 15.

18 Mazzone and Elgammal (2019), p. 2.

19 *Ibidem*.

20 Elgammal *et al.* (2017), p. 6.

an artist digests art history”²¹ before leaving behind established styles and creating new ones, the dataset for CAN was not curated. Instead, the algorithm was fed with 80,000 images, along with their titles, that represented five centuries of Western art history. The model was inspired by the works of D. E. Berlyne and Colin Martindale, who each posited that “artists would try to increase the arousal potential of their art by creating novel, surprising, ambiguous, and/or puzzling art.”²² Essentially, in order to avoid habituation and so a reduced arousal potential, it was hypothesized that an art-producing system needs to produce a graduated change in its output. Accordingly, to increase the arousal potential of the art-producing system, Elgammal and his colleagues built an “agent that tries to increase *stylistic ambiguity* and deviations from style norms, while at the same time, avoiding moving too far away from what is accepted as art.”²³

Like GAN, CAN has two adversary networks, a discriminator and a generator, however, unlike GAN, the generator receives two signals for any work it generates. The first signal is similar to that found in GAN and is the discriminator’s classification of whether or not an image is art. The second signal however, pertains to “how well the discriminator can classify the generated art into established styles.”²⁴ That is, the generator tries to fool the discriminator that the image it has generated is art, while also

21 Mazzone and Elgammal (2019), p. 4.

22 Elgammal *et al.* (2017), p. 6.

23 *Ibidem*, p. 5.

24 *Ibidem*, p. 6.

trying to confuse the discriminator about the style of the work which has been generated. These two signals contradict one another - the first pushes the generator to produce an image that the discriminator accepts as ‘art’, yet if the generator succeeds and the discriminator is also able to classify that style, then the second signal penalizes the generator and thereby encourages the generator to produce “style-ambiguous works.”²⁵ As a result, the AI agent is not only able to produce novel artefacts, but it is able to self-assess these products, thanks to the interaction between the two signals. AICAN can even name the work it generates, such as *The Beach at Pourville*.²⁶

To evaluate the creativity of the model and the quality of the images generated by CAN, its products were put to the test against a set of works from Art Basel 2016. In 75% of cases, the human subjects thought that the images generated by AICAN were created by a human artist.²⁷ To put this into context, for the baseline abstract expressionist set, human subjects thought that the work was by human artists 85% of the time. More remarkably still, the human subjects rated the images generated by CAN higher than those produced by human artists. These results surprised even those who conducted the experiments. As Elgammal and his colleagues exclaimed: “the fact that subjects found the images generated by the machine intentional, visually structured, communicative, and inspiring,

²⁵ *Ibidem*, pp. 6-7.

²⁶ Elgammal (2018).

²⁷ Mazzone and Elgammal (2019), pp. 4-5.

with similar levels to actual human art, indicates that subjects see these images as art!”²⁸ The works have been shown worldwide and in November 2017, the first work offered for sale from the AICAN collection, *St. George Killing the Dragon*, was sold for \$16,000 at an auction in New York. Elgammal has said that while, as a scientist, he created the algorithm, “the machine chooses the style, the subject, the composition, the colors and the texture” and so when exhibiting the work, he gives sole credit to AICAN for each work.²⁹

We have then, come some way since the days of AARON-style programs. GANs and CANs are trained on datasets of images to generate novel and largely unexpected results. Nevertheless, it is still not entirely clear how much credit we can grant these AI agents in creating works *qua* art. For instance, in their experiment, Elgammal and his colleagues were testing whether the products of AICAN could be “recognized as quality aesthetic objects by human beings.”³⁰ There are some limitations to this approach and what it tells us about attributions of agential creativity in the context of visual art practice. As other empirical studies suggest, it seems that while folk are “by and large as willing to consider robot creations as art as human creations”, this “perceived similarity does not extend to creative agency: robots whose paintings are deemed art are not considered artists, whereas humans are.”³¹ This, Mikalonytė and Kneer propose, is likely due to the fact that mental

²⁸ Elgammal *et al.* (2017), p. 18.

²⁹ Elgammal (2018).

³⁰ Mazzone and Elgammal (2019), p. 6.

³¹ Mikalonytė and Kneer (2021), p. 10.

state ascriptions are significantly lower for robots than human agents.³² Thus, while the products of AICAN, absent of contextual information about their AI origins, might be perceived as quality aesthetic objects by human beings, it is not clear that such AI agents actually meet the conditions to qualify as creative agents responsible for the production of works as artworks. Accordingly, in the next section, I will expand on what these conditions are, and evaluate whether AI agents, such as AICAN, meet them.

3. Artistic Creativity

It is standardly conceived that agential creativity pertains to the production of artefacts or states that are both novel and valuable.³³ Importantly however, as Gaut has explicated, we need not understand the latter in terms of something being valuable period.³⁴ Rather, when we speak of creativity and value, we can take this to mean the production of something that is valuable of its kind. In relation to the cases under discussion then, our concern pertains to the production of new artefacts that possess artistic value. That is, we are interested in whether AI agents can be described as *artistically* creative.

Importantly, we do not credit agents as creative if they realized values by accident, or by mechanical search procedures. If a computer program simply

³² *Ibidem*, p. 7.

³³ Boden (2004).

³⁴ Gaut (2018), p. 128.

went through every possible combination of pixels then we would not be inclined to say it had been creative in producing the resultant images. In order to count as creative, an agent must have exercised “*knowledge of how* to produce a result with the relevant values”³⁵, and to have exhibited “an evaluative ability directed to the task at hand.”³⁶ The latter is important because if one is to produce something new, then one cannot know in advance precisely “both the end at which she is aiming and the means to achieve it.”³⁷ From this necessary aspect of spontaneity,³⁸ it is of great importance that one is able to judge the value of the results of one’s acts, if we are to deem these as creative.

Given this, is there anything to recommend the attribution of artistic creativity to systems like AICAN? Certainly, it can generate novel images that are judged as aesthetically valuable. The features of these images do not neatly fit pre-existing styles. Also, based on its training, AICAN can name the images it generates appropriately relative to what they appear to depict. These are then, some factors that could be used to positively motivate the claim that this AI agent can be artistically creative. However, there are some challenges to be met if this claim is to be substantiated: (1) in generating and naming novel, stylistically ambiguous images that realise aesthetic values is the AI agent exercising knowledge-how and an evaluative ability directed to the task at hand? (2)

³⁵ *Ibidem*, pp. 131-2.

³⁶ Gaut (2010), p. 1040.

³⁷ Gaut (2018), p. 134.

³⁸ See also Kronfelder (2009) on spontaneity and creativity.

Relatedly, and more fundamentally, which properties of a work are important in relation to artistic value, and so to the claim that an agent has been artistically creative?

3.1 Knowledge-how and Evaluative Abilities

In relation to (1), there are reasons to doubt that programs like AICAN can exercise knowledge-how.³⁹ As alluded to in Section 2, it is generally agreed that AI agents, at least for now, do not have mental states, such as beliefs and intentions. Without beliefs and intentions, the AI agent lacks appropriate reasons to guide its workings, and instead follows the reasons of others. In the case of AICAN, as outlined earlier, Elgammal and his colleagues acted to make an art-producing system that, given its programming and training, would increase the arousal potential of the work by increasing stylistic ambiguity and deviating from style norms, while avoiding moving too far away from what is accepted as art. Importantly then, in generating and naming novel, stylistically ambiguous images, the AI agent is following the reasons of others. By following, rather than “inventing or choosing to follow a particular algorithm,”⁴⁰ the AI agent fails to be creative. Similarly, the evaluative ability of the

³⁹ With thanks to an anonymous reviewer for pushing me to elaborate on the current capabilities of AIs.

⁴⁰ Gaut (2018), p. 138, n. 10.

AI agent is guided by the reasons of others – once it has generated an image that sufficiently balances the demands of stylistic deviation and familiarity, as per the directive of Elgammal and his team, it presents this as its output. Thus, the response to (1) is negative – even before tackling the thorny issue of artistic value, we can say that an AI agent like AICAN does not possess the requisite attributes to achieve artistic creativity.

The story should not end there though. While AI agents do not exhibit states like intentions, their workings are not random either.⁴¹ As, Manovich has outlined, the products of such systems are not just mechanically juxtaposed elements “and they are not simply instances of remix aesthetics.”⁴² So, while an AI agent may not steer a creative undertaking, this is not to say that it fails to make a substantial contribution to one: an AI agent can generate images with novel and valued features, however its doing so is dependent upon the goal of humans, who can qualify as creative agents as they possess the requisite beliefs and intentions to guide their actions.⁴³ By determining some of the salient features of a work, an AI agent arguably deserves credit for its contribution to the production of a work *qua* art.⁴⁴

To understand the nature of this contribution and how creditworthy it might be, it helps to

41 Ornes (2019), p. 4762.

42 Manovich (2019).

43 See Steinert (2017) for an account that complements the idea that AIs can produce works of art in virtue of the intentions of their makers.

44 See Anscomb (2021a) for an account of creative agency and credit in collective working practices.

distinguish between the syntactic and semantic levels of a work. We are not able to simply ask the AI agent why, for example, it represented the organic forms in the centre of *The Beach at Pourville* in the indeterminate manner that we see.⁴⁵ There is definitely a concerted effort to understand the decisions that AI makes (a lot rides on this when these decisions pertain to safety critical applications of this technology for instance), but even efforts to make AI decisions more transparent tend to involve humans coming to conclusions inferred from the information available.⁴⁶ It is unlikely then, that AI agents work to create a piece with meaning, in the way we expect human agents to do.

This is a major difficulty for creating artificial artistically creative agents - as currently incarnated, programs like AICAN lack the social and experiential dimensions that typically feed into both the production and reception of art.⁴⁷ This is something that Elgammal and his colleagues have, to some extent, acknowledged in relation to AICAN: “The algorithm might create appealing images, but it lives in an isolated creative space that lacks social context. Human artists, on the other hand, are inspired by people, places, and politics. They create art to tell stories and make sense of the

45 As Mikalonytė and Kneer outline, machines “(arguably) do not have intentions and there isn’t much of an inner world to express.” (2021), p. 3. In relation to the latter point, some have conjectured that when AI begins to represent the world from its perspective then it can be deemed properly artistic. See, for example, Du Sautoy (2019).

46 Hagendorff and Wezel (2020), p. 360.

47 Kelly (2019).

world.”⁴⁸ Elgammal has posited however, that works generated by AICAN can be grounded in our society and connected to contemporary concerns by human curators. In fact, this is precisely what happened: at the 2018 Frankfurt Book Fair, Elgammal and his colleagues exhibited a series of portraits generated by AICAN that they titled *Alternative Facts: The Multi Faces of Untruth*.⁴⁹ In this situation however, humans also determine the meaning of the work through their acts of display. After all, how could this isolated AI agent have worked out that the distorted images, resembling human figures, it generated, were potentially relevant to current human socio-political affairs? One might respond that curators can affect the meaning of a human artist’s work through their acts of display, but this is usually to produce a dialogue with the meaning of the work, as conceived by its creator(s). It is not clear that this is what happens when AI-generated works are displayed.

The semantic content of the work then, is not due to the AI agent, but those who programme it, or display its outputs.⁵⁰ While the formal features of the work are also in some respects determined by human agents, who decide what the AI should be trained on, there seems to be an important sense in which these are also dependent upon the workings of the AI agent, which, based on its programming and training, autonomously and iteratively generates

48 Elgammal (2018).

49 *Ibidem*.

50 This could also point to an interesting democratization of creative responsibility among human agents working with such systems.

images with new or unexpected features that, in the case of AICAN, do not neatly fit pre-existing styles. The exact features of the images are not something that the human agents have direct control over – as we have seen, those working with AI agents often report being surprised by the exact combination of features they output. So, in response to the question of what kind of contribution an AI can make to the production of artworks, we might respond, with some important caveats, that it is at a syntactic level – while human agents are ultimately responsible for determining the kind of features that the work will exhibit (e.g., as inspired by the pictorial possibilities found in the Western canon of art), the exact formation of the work’s formal features are in a non-trivial sense dependent upon the generative processes of an AI agent. It is plausible then, that AI agents, such as AICAN, play a not insignificant role in generating formal properties of a work that realize values that are among those that might be said to constitute, or contribute to, a work’s artistic value. I say ‘might’ because, as (2) indicates, the subject of artistic value is subject to much dispute.

3.2 Artistic Value

According to some philosophers, including Gary Iseminger and Nick Zangwill, artistic value is to be understood in terms of aesthetic value. Essentially, on these accounts, artworks are valuable to the

extent that they fulfil the function to be aesthetically appreciated. Iseminger, for instance, has argued that “the function of the artworld and the practice of art is to promote aesthetic communication.”⁵¹ On this account, “a work of art is a good work of art to the extent that it has the capacity to afford appreciation.”⁵² In order to achieve this state, Iseminger appeals to paradigm cases of designing and making, “where someone formulates a plan and, acting in accordance with that plan, intentionally brings something into existence and endows it with certain properties.”⁵³ In a similar spirit, Zangwill has defended the view that a work of art is the “intentional product of aesthetic creative thought”, by which he means that someone has an insight into the dependency of aesthetic properties on non-aesthetic properties, and then intentionally endows something with aesthetic properties such as beauty or elegance, in virtue of non-aesthetic properties such as size or colour.⁵⁴ In trying to produce a work of art, Zangwill has argued that agents try to achieve substantive aesthetic effects, and thereby create something of aesthetic value. These accounts then, offer an understanding of artistic value in terms of aesthetic value, however not everyone agrees that we should conceive of artistic value as a monist value.

According to a pluralistic understanding of artistic value: “artistic value is a function of, and derived from, a plurality of more basic values,

⁵¹ Iseminger (2004), p. 71.

⁵² *Ibidem*, p. 129.

⁵³ *Ibidem*, p. 46.

⁵⁴ Zangwill (2007), pp. 36-38.

including, but not confined to, aesthetic value. Artworks are also valued as artworks for their cognitive value, ethical value, art-historical value, interpretation-centred value, and in other ways as well.”⁵⁵ As Robert Stecker elaborates, on this conception, artistic value “is a composite of several different values, so that those who act in relation to artworks, from artist to performers, to promoters, will have reasons to act and will achieve things in relation to several kinds of value.”⁵⁶

Taking this kind of approach, one might conceive of artistic value in terms of a disjunctive or cluster account, whereby an artwork may have all, or at least some, of the values that contribute to artistic value.⁵⁷ These values will make different contributions to a work’s value as art, depending on the nature of the work. For instance, the value of conceptual works as art is primarily found in their cognitive, rather than aesthetic values. This approach does however, leave open questions regarding how to determine which values are artistic for a given work. To establish when a value is artistic, Stecker has proposed that “it is plausible to consider a value as artistic by seeing how it functions in critical evaluations, and in its role in what the artist intends to do in the work.”⁵⁸ Contextual information then, is vital to establishing which values contribute to a work’s value as art. Indeed, Stecker, has proposed that: “To understand

⁵⁵ Stecker (2019), p. 42.

⁵⁶ *Ibidem*, p. 36.

⁵⁷ With thanks to an anonymous reviewer for encouraging me to clarify what kind of pluralist approach is under discussion.

⁵⁸ *Ibidem*, p. 50.

the artistic value of particular works requires an understanding of what the artist who makes the work is intending to do in it – what functions it is intended to fulfil or what it is intended to achieve. Such intentions are not *sui generis*; they arise within artistic traditions or practices.”⁵⁹

Notably, these practices pertain to techniques, and also to what Dominic McIver Lopes has described as “norms for appreciation.”⁶⁰ For instance, in addition to sharing a medium profile, what Lopes has referred to as “classic” and “cast” photography share the norm of depicting by belief-independent feature-tracking (the contents of the image will reflect what is actually before the viewfinder, not what the photographer *thinks* they see through the viewfinder). Nonetheless, this norm is utilized and appreciated differently in these practices: “cast photography exploits the documentary duplication of cast or staged scenes, while the classic tradition takes advantage of revealing accidents.”⁶¹ Looking at the formal features of a photographic image does not usually reveal that this norm has been used to different artistic ends in these practices – contextual information is key. This may range from basic information such as who created the work and when, to excerpts of the artist’s thoughts about the process and the broader context in which they place their work. Relatedly, Paisley Livingston has argued that taking artist’s intentions into account when interpreting and

⁵⁹ *Ibidem*, p. 42.

⁶⁰ Lopes (2014).

⁶¹ Lopes (2016), p. 69.

evaluating a work can help appreciators discover a range of “specifically artistic values.”⁶² Livingston has advocated that an intentionalist orientation can aid the process of interpreting a work’s meaning, and can be “decisive with regard to the work’s implicit content.”⁶³ According to those who are pluralist about artistic value then, the intentions of art makers are important because they can direct us to the values that constitute a work’s artistic value.

Monists also place importance on the intentions of art makers, however given the identification of artistic value with aesthetic value, as Zangwill outlines, on this approach “it could be that the best way to know about the author’s aesthetic intention is to consider the work itself.”⁶⁴ By contrast, intentions that are pronounced outside of the work or inferred through contextual information arguably play a more central role for the pluralist given that they help determine which kinds of values contribute to the artistic value of the work. Interestingly, as Elgammal reported, when the work of AICAN was exhibited at a range of venues in Frankfurt, Los Angeles, New York City, San Francisco, and Miami, viewers who did not realize that the work had been generated using AI frequently inquired as to who the artist was.⁶⁵ Although asking this question is a good indicator that the work is viewed as the product of a creative agent, I think that it reflects the fact that, at least until recently, if presented with an artefact

62 Livingston (2005), p. 173.

63 *Ibidem*.

64 Zangwill (2007), p. 48.

65 Mazzone and Elgammal (2019), p. 5.

that looks like an abstract painting, or a landscape painting, it was basically guaranteed that this was the direct product of human action. There may be a variety of reasons as to why these viewers asked that question, one quite likely reason being that they hoped to situate the work within a particular context that would have guided their interpretation and evaluation of the work as art, as is evident that many appreciators are inclined to do.

3.3 The Contribution of AIs to Artwork Production

Based on the foregoing, there are grounds to say that the credit we might grant an AI for its contribution to the production of a work *qua* art, will vary depending upon the conception of artistic value we take. On a monist conception, an AI agent arguably deserves a greater share of the production credit relative to that which it might deserve on a pluralist approach - whereby there are disjunctively necessary conditions so that a work must possess some of the component values constituting artistic value⁶⁶ - due to the fact that, in the former case, it contributes a greater proportion of the relevant properties upon which the value of the work (as determined by human agents) depends. Put simply, in the latter case, it is more difficult for an AI agent to contribute the range and types of properties that

66 Gaut (2000), p. 27.

realize a plurality of values that are among those that might contribute to a work's artistic value.

While an AI agent may plausibly be said to contribute to the realisation of the aesthetic value of a work by generating salient formal properties, its lack of semantic contribution arguably prohibits this being the case for most other kinds of values that might constitute artistic value. Accordingly, if aesthetic value is being balanced with other values, then the contribution of the AI agent to the production of a work *qua* art is smaller relative to when aesthetic value is the primary concern. Building on this, we can project that should it become possible for AI agents to possess states like intentions, it would be easier for them to count as artistically creative according to a monist conception of artistic value as aesthetic value in contrast to the pluralist conception whereby several different types of value must be instantiated and balanced in a work.

In sum, although AI agents are not themselves artistically creative, they can work iteratively without human intervention to non-accidentally generate the formal features of an image, and thus contribute to the realisation of some of the salient properties of a work. Whether this deserves some greater or lesser share of the credit for the production of the work *qua* art depends upon whether one takes a monist or pluralist conception of artistic value. In either case, what has emerged is a picture where the interactions between AI and human agents are key to the realisation of the artistic value of the kinds of work under discussion. We can see this more clearly

with other examples of visual art practice involving AI. Take Anna Ridler’s project *Bloemenveiling* (2019), which she undertook in collaboration with David Pfau. Ridler and Pfau modelled the work on the 17th century tulip mania auctions in Holland. The work consists of short moving image pieces of tulips that are generated by GANs, and then “sold at auction using smart contracts on the Ethereum network.”⁶⁷ As Ridler and Pfau explain: “Each time a tulip is sold, thousands of computers around the world all work to verify the transaction, checking each other’s work against each other [...] While the artificial intelligence behind the moving image pieces has the potential to generate infinite flowers, the enormous distributed network behind Ethereum is used, at great environmental cost, to introduce scarcity to an otherwise limitless resource.”⁶⁸

This example aptly demonstrates that the AI makes an important contribution to the aesthetic value of the project, and moreover, that it does so in a way that is distinctive of its potentially limitless, generative nature. It also shows that the meaning of the work sits squarely with the human agents, Ridler and Pfau, who determined that the AI be used in combination with the blockchain to create artificial scarcity in order to interrogate the “way technology drives human desire and economic dynamics.”⁶⁹ As Hagendorff and Wezel put it: “Applications of AI bring the intentions of their developers into being.”⁷⁰

67 Ridler and Pfau (2019).

68 *Ibidem*.

69 *Ibidem*.

70 Hagendorff and Wezel (2020), p. 358.

It is important then, that the contributions of the AI are not over-played,⁷¹ as in the case of AICAN, nor downplayed⁷² but credited appropriately in order to do justice to the complicated human-AI interactions that underpin the works.

4. Creating Art with AI

AI agents cannot compete with, nor replace human artistic creativity, but can realise formal properties distinctively of the ways in which human agents can and so potentially enhance the value of a human creative agent's artistic project. To provide a clearer picture of how the interactions between humans and AI agents impact upon one another in the production of artworks, in what follows I will explore another of Ridler's projects, along with two other case studies, Susie Fu's *Artist and Machine* performances, and Sougwen Chung's *Drawing Operations* project.

Ridler has undertaken many projects that incorporate AI to explore, and reflect on, the impact that technology has had, and continues to have, on our interactions with the world. For *The Fall of the House of Usher* (2017), Ridler made two hundred ink drawings based on stills of the 1929 film version of Edgar Allan Poe's 1839 short story of decay and

71 See Popa (2021) for a discussion of the repercussions of neglecting human goals when considering AI behavior.

72 Steinert (2017), p. 282.

destruction. Ridler fed these into a generative model which produced new iterations of these images that she then arranged into a short, animated film. Significantly, Ridler used this extremely labour-intensive procedure in combination with machine learning to “heighten and intensify the film’s original motifs and to liberate fugitive aspects of memory to create a sense of the uncanny that is partly machine-made.”⁷³ The AI-generated images, with their pixelated yet painterly monotone features, provide a shadowy rendition of the story. By arranging these AI-generated stills, Ridler was able to convey the uncanny qualities she aimed to realize, as she explored the impact of technology on our interactions with the world. Ridler’s concerns about new technology are also echoed in the work of other artists who use AI, including Susie Fu and Sougwen Chung.

To examine the entangled relationship between human and machine labour, from 2018-2020, Susie Fu undertook three live performances, *Artist and Machine*, where she drew alongside a machine. In each performance, both the “Artist” and “Machine” drew portraits of members of the audiences. The Machine, equipped with a webcam and neural networks, had learnt to draw like the Artist, and tried to improve with each new performance.⁷⁴ A feedback loop was developed, whereby after drawing hundreds of portraits of the audience members, the Artist developed and practiced her technique, which was then used to update the machine’s training

73 Ridler (2017).

74 Fu (2020), p. 383.

set. Consequently, the machine also improved. In Fu's words, "the piece condenses the development of AI-powered technology into the confinement of a performance space, taking normally unseen data and processes and making them physical and experienceable for the viewer."⁷⁵

Notably, Fu, working at a human pace, produced far fewer portraits than the Machine, which produced an abundance of portraits, and only stopped when it required paper refills. The distinction between the natures of human and machine labour also revealed a duality in the behaviour of the audience members. They happily returned to the Machine to have their portraits made, but did not do so with the Artist – it was evident that the process of being stared at by another human was a much more uncomfortable experience for audience members, than appearing before a webcam to have a likeness, or multiple likenesses, made. Fu has proposed that the polarizing behaviour of the audience members is reflective of "the inevitable shift towards an automated world."⁷⁶ Not only then, is the aesthetic of the images generated by the AI significant in relation to the value of the work as art, but also the way in which these images are generated by the inexhaustible, and ever-evolving machine. The dynamic properties of the AI are also relevant in relation to the interpretation-centred value of the work, as determined by Fu, who aimed for audience members to explore, through the piece, the "achievements, consequences, and implications

⁷⁵ *Ibidem*, p. 384.

⁷⁶ *Ibidem*, p. 386.

of a society dependent on and intertwined with automated machines.”⁷⁷

Sougwen Chung has also taken an interest in human-machine feedback loops - since 2014, she has been working on her Drawing Operations series with different robots named D.O.UG. (Drawing Operations Unit: Generation_) to explore human-machine collaboration. This undertaking has seen Chung working with robotic arms that generate sketches, alongside Chung, based on neural nets trained on her drawings. D.O.U.G_5 for instance, has seen Chung ‘collaborate’ with the arm to produce sketches of human figures. Chung embarked upon this figurative aspect (previous units had explored abstract mark-making) of the project during the COVID-19 pandemic, to reflect how “our current systems of communication, in this era of profound unrest, beg for more than disruption, but a restart.”⁷⁸ Importantly, it is impossible to distinguish between which marks were made by the arm, and which were made by Chung. As Claire Voon has written of this process, “a result of the human sensorium through and through, [Chung’s] works double down on the entanglement of all bodies (biological, mechanical, and otherwise), never really disembodied but always becoming.”⁷⁹ Central then, to this process which exemplifies the entanglement of all bodies, including those that are sentient and non-sentient, is the contribution of the AI to Chung’s artistic intentions.

⁷⁷ *Ibidem*, p. 384.

⁷⁸ Chung (2020).

⁷⁹ *Ibidem*.

The aesthetic value of the work, which is realized in the fused gestures and patterns of the human artist and AI reflect the interdependence of these different forms of agency.

In each of these cases, while the human agents are ultimately responsible for the semantic content of the work, the realization of this depends, non-trivially, on the properties of the images that the AI they each produce the work with generates. Take, for instance, the at-once painterly and pixelated forms that just about resemble the human figures and objects of the original *The Fall of the House of Usher* film, which were generated by the GAN. These formal properties are key to the creation of the uncanny aesthetic that embodies Ridler's intent "to accentuate the horror story in the original film and notions of fear around artificial intelligence itself."⁸⁰ Meanwhile, the shared aesthetic properties of Chung and D.O.U.G_5's mark-making underscores the meaning of the work as reflecting "the entanglement of all bodies". Furthermore, the interpretation-centred value of *Artist and Machine* is dependent upon the dynamic properties of the Machine, as it produces an enormous and rapidly evolving output in contrast with the Artist. The artistic value of these works thus partly depends upon the properties of the images and performances that are generated by the AIs that they work with.

Importantly, these properties, that realize the relevant values, are created using processes that operate without the direct intervention of the artist,

80 Ridler (2017).

and so invite novel, and not entirely predetermined results. For example, Ridler could not have foreseen exactly how the AI agent would interpret her ink drawings, but far from resulting in a loss of control over the work, this reinforced its semantic content, as determined by Ridler. One might object that nothing new is happening here. After all, the same could arguably be said of other image-making technologies that automate some aspect of the image-making process. Photography, for instance, can also produce unanticipated results, both when a photographic exposure is made, and when it is processed. Take solarisation – this technique (discovered by Man Ray and Lee Miller), which partially reverses the tones of the image, was an unexpected outcome of continuing to process a partially developed photograph exposed to light. However, unlike such chance events whose outcomes are caused by physical processes (such as the reaction of photo-sensitive materials to light), AI agents work iteratively to non-accidentally generate new visual content based upon the datasets they are provided with.

AI agents can generate formal properties that artists may not fully anticipate in advance of their creation, and so contribute to the realisation of some of the salient properties of a work, and thus its artistic value. Accordingly, while we would not usually be inclined to grant any form of production credit to image-making technologies, this, I propose could be different with AIs that can work iteratively without human intervention to produce potentially endless permutations of visual forms based upon all

different kinds, and enormous quantities, of data – which may be more than individual humans could ever hope to process themselves. Importantly, as the foregoing demonstrates, treating the contributions of AIs in this way also has appreciative relevance.

The ways in which AI contributed to the values of the projects under discussion were distinctive of the ways in which human agents might do so. Moreover, these artists each invite a degree of spontaneity into their practices, as the AIs they work with process the data to generate outputs that provide these artists with a new perspective on the data that they work with. Interestingly, in each of these cases the artist's data sets, at least partially, consisted of their hand rendered drawings. The AIs that they choose to feed these drawings into offered a fresh perspective on the different directions and iterations that their styles and works could take. This diversity of approaches can prove to be an important catalyst for artistic creativity, and so can lead to an increase in the novelty and value of the resulting work. The fact that each of these artists uses their own drawings is also reflective of the stage we are at with the development of AI – we are still exploring how a world with more human-machine interactions will look, and what form these interactions could take. Indeed, the very ideas that many artists are exploring using AI pertain to the wider social, economic, and political consequences of the development of this technology. Chung, for instance, has sought to “synthesize tradition and technology, and the techniques of culture, to

explore new ways of making.”⁸¹ So, in addition to providing new means with which to realize artistic intentions, AI can actually inform the content of these intentions.

5. Conclusion

It is not uncommon for parallels to be drawn between photographs and AI-generated works.⁸² That is, just as photography was initially subject to art-world scepticism, so too are AI-generated works for their reliance on a machine. It has been proposed by figures, including Elgammal, that just as photographs were eventually accepted by the art world, so too AI-generated works will one day be widely accepted.⁸³ I think however, that a different parallel is more fitting: there is a historical tendency to overplay the reaches of new imaging technologies. For example, following the invention of photography, pioneering figures in the field, ranging from Joseph Niépce to Henry Fox Talbot and Lady Eastlake, described the process as giving “nature the power to reproduce herself.”⁸⁴ Yet, early forms of photography required handiwork throughout their production⁸⁵ and it is now becoming increasingly recognized that agents have harnessed a naturally occurring process

81 Pranam (2019).

82 Hertzmann (2018); Du Sautoy (2019), p. 107.

83 Elgammal (2018).

84 Costello (2017), pp. 11-12.

85 Maynard (2000), p. 67.

(light causing material changes in photosensitive objects) to engineer artefacts (photographs).⁸⁶ Just as early photographs were initially described as being produced independently of human agents, so too, it seems, are many AI-generated works. As Mateas has highlighted: “AI research practice downplays the role of human authorship within the system because this authorship disrupts the story of the system as an autonomously intelligent entity.”⁸⁷ There might be a variety of reasons for this, including financial incentives.⁸⁸

Importantly, just as we now grant that human agency permeates photographic processes, so too, I suggest, it is key to recognize the interaction between human and machine agencies involved in the production of even the most advanced computer-generated artworks. Just as the artistic significance of photographic works is grounded in their origins in human creative agency,⁸⁹ so too, I propose, is the artistic significance of contemporary computer-generated works. As McCormack *et al.* highlight, in generative art, “the primary artistic intent [...] is expressed in the generative process,” and moreover, “the way this process is interpreted or realized is also the locus of artistic intent and is intimately intertwined with [this].”⁹⁰ Distinctively however, of computer-generated art practice that employs computer vision and machine-learning technologies,

86 See for example, Atencia-Linares (2012); Lopes (2016); Phillips (2009).

87 Mateas (2001), p. 151.

88 Notaro (2020), p. 326.

89 Anscomb (2021b).

90 McCormack *et al.* (2014), p. 138.

is that while dependent on the goals of humans the AI agent can work iteratively, drawing on vast quantities of data, to non-accidentally realise new and unexpected formal properties and thus contribute to the realisation of some of the salient properties of a work. As I have established in the foregoing, AI in and of itself is not artistically creative but can arguably be deserving of some share of the production credit for works of art. How great a share it potentially deserves depends upon whether one takes a monist or pluralist conception of artistic value. In any case, AI is certainly opening up new opportunities for human artistic creativity.⁹¹ In order to fully appreciate these new ideas and possibilities however, we need to ensure that greater attention is given to the human-machine interactions underpinning these, which are not always directly perceptible.⁹²

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91 Jeon et al. (2019), p. 116; Edmonds (2018), p. 6.

92 McCormack et al. (2014), p. 139; Nake (2014), p. 108.

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