

**(Art)ificial Intelligence: A Study on the Theoretical Foundations of Copyright Law and  
the Copyright Protection of Machine Creativity**

Neo Hao Jun

Hwa Chong Institution (High School Section)

Expert-Mentor: Assoc Prof Dr Jennifer Ang, CUC, SUSS

Teacher-Mentor: Ms Gan Jia Ying Priscilla

Group 2A-13

Total Word Count (excluding appendices, footnotes & references): 5495

# TABLE OF CONTENTS

<b>1. INTRODUCTION</b>	<b>3</b>
1.1 Background	3
1.2 Rationale	4
1.3 Research Questions	4
1.4 Thesis Statement	5
1.5 Scope of Research	5
1.6 Significance of Research	6
1.7 Limitations	7
<b>2. LITERATURE REVIEW</b>	<b>8</b>
2.1 Generative Adversarial Networks	8
2.2 Theoretical Foundations of Copyright Law	8
2.2.1 <i>Personality Theory</i>	9
2.2.2 <i>Fairness, Welfare, and Culture Theory</i>	9
2.3 Discussions Surrounding Copyright Protection of AI Art	10
2.4 Legal Personhood for Machines	11
2.4.1 <i>Interactions with One's Environment</i>	12
2.4.2 <i>Selfhood</i>	12
2.4.3 <i>Community</i>	13
<b>3. METHODOLOGY</b>	<b>13</b>
<b>4. DISCUSSIONS</b>	<b>15</b>
4.1 GANs' Eligibility for Legal Personhood	15

<i>4.1.1 On Interactions with One's Environment</i>	15
<i>4.1.2 On Selfhood</i>	16
<i>4.1.3 On Community</i>	17
4.2 Manifestation of Creators' Personhoods in AI Art	19
<i>4.2.1 On the User</i>	19
<i>4.2.2 On the Trainer</i>	20
<i>4.2.3 On the Programmer</i>	21
<b>5. CONCLUSION</b>	<b>22</b>
<b>REFERENCES</b>	<b>24</b>

# 1. INTRODUCTION

## 1.1 Background

In 2018, *Edmond de Belamy*, from *La Famille de Belamy*, the first-ever work of art created by an algorithm, was sold for 432,500 USD - “a whopping 4,320 per cent increase from the presale high estimate of 10,000 USD” (Kinsella, 2018, para. 2). The sale highlighted artificial intelligence’s (AI) increasingly anthropoid characteristics and shone a spotlight on one specific characteristic that challenged the boundaries of machine learning and creativity: AI art - machines were now “composing music that sounds ‘more Bach than Bach’” and “turning photographs into paintings in the style of Van Gogh's *Starry Night*” (Miller, 2020, Book synopsis).

The creation of AI artwork is mostly enabled by Generative Adversarial Networks (GANs), “where two neural networks, a series of algorithms that mimic the operations of a human brain to recognize relationships between vast amounts of data, are pitted against one another in order to generate new, synthetic instances of data that could pass for real data” (Nicholason, n.d., para. 1; Chen, 2020, para. 2).

Due to AI-generated works’ ability to pass as real and original pieces of art, there is good reason to believe that the artworks should be copyrightable. We thus turn to the question of who owns that copyright. Yanisky-Ravid (2017, p. 682) notes that there are four main contenders for the ownership of computer-generated artworks, namely:

1. The programmers,
2. The trainers (the people who provide the data by curating a dataset),
3. The users (the humans operating the AI system), or

4. The AI systems themselves.

## **1.2 Rationale**

The question of who owns the copyright for AI artwork is important because of the increasing blurring of the line between human- and machine-crafted artworks. With rapid technological progress, AI is now increasingly able to arrive at an output that the human is not able to control and has evolved to a point where it is able to undergo unsupervised learning on its own. Hence, the mechanics within the creator's brain and those within an algorithm seem to have become much more similar, raising questions regarding the suitability of granting machines protection equivalent to that accorded to humans, adding greater complexity to the current copyright framework.

Moreover, Walker (2020, para. 10) argues that "if an AI-generated artwork is not protected by copyright, it belongs to the public domain, and anyone can freely make copies of it, distribute it, use it for commercial purposes or sell it to others".

## **1.3 Research Questions**

The overarching question this paper seeks to answer is: who should own the copyright of AI art? To answer this question, the research questions are as follows:

1. To what extent do GANs meet the requirements of Hubbard (2010)'s benchmark for the recognition of AI systems as legal persons?
  - a. Are there any shortcomings in Hubbard's model that might make it difficult to accord copyright protection to AI systems?

2. With reference to Personality Theory (Hegel, 1821), a theoretical foundation of copyright law, how strongly do each of AI art's four main creators express their personality through the artwork?
  - a. Hence, to what extent does AI artwork manifest each of its creators' personhood?

#### **1.4 Thesis Statement**

Although the machine does meet some of Hubbard's (2010) requirements for legal personhood, the persisting human standards he upholds in the assessment of machines restrict our evaluation of them and in turn seems to suggest that GANs are not yet suitable for legal personhood under his model. In turn, the users and trainers of AI systems should receive shared copyright protection for machine-generated artwork, for they both apply their unique character traits in the process of creation, making the work produced a sufficient embodiment of their personality under Personality Theory. Although this paper does find that the user's personality might manifest itself more than that of the trainer in general, the proportion of protection granted to each author can differ on a case-by-case basis depending on the extent of each of their involvement in the creation process.

#### **1.5 Scope of Research**

To determine the owner of the copyright of AI art, it would be useful to turn to copyright law and its theoretical foundations. There are generally four different theories that undergird copyright:

1. Personality Theory, which focuses on protecting the emotional bond between the artist and his/her creation.
2. Fairness Theory, which is based on the premise that hard work should be rewarded and authors should retain control of the fruits of their labours.

3. Welfare Theory, which applies economic constructs to promote the interests of society as a whole and favours the greatest good for the greatest number of people.
4. Culture Theory, which contends that the law should cultivate a just and attractive culture. (Meindertsma, 2014, paras. 3-6; Wilkof, 2014, p. 257)

Personality Theory will be focused on in this paper, as it grants copyright protection based on the connection between the creator and the artwork. This allows for an approach to copyright accordance more directly related to the process of creation, which was deemed to be the most relevant due to the introduction of a non-human creator, as opposed to an approach based on the effects of copyright conferment on the wider community suggested by Welfare Theory and Culture Theory, or the quantitative amounts of work done propounded by Fairness Theory.

To determine whether a machine exhibits signs of “personality”, Hubbard’s (2010) criteria for legal personhood was chosen because it covers some of the more critical human cognitive processes in creation which Personality Theory also seeks to protect, making it useful in assessing whether machines should be granted copyright protection under Personality Theory.

Additionally, due to time constraints, the protection of art created solely by machines, rather than by machines in collaboration with humans, will be discussed in this paper so as to simplify the discussion.

## **1.6 Significance of Research**

While numerous studies have been conducted regarding the intellectual property protection of AI-crafted creative work, many of these studies tend to focus on the wording of the current

copyright law and not the philosophical bases for it, as will be covered in the Literature Review section. Copyright law was originally written to protect human creation and the way it was phrased might thus not fit in our digital world today. Exploring the tenets of copyright law would be a more suitable way to determine the owner of AI art copyright regardless of the current legal phraseology.

Furthermore, it is still unclear whether machines could be seen to have a “personality”, something that is widely regarded as belonging to a human. Hence, this paper seeks to explore present discussions on the granting of legal personhood to AI systems and in turn evaluate whether GANs meet the minimum requirements necessary for the conferring of said personhood, contributing to the existing discussions in the current literature.

### **1.7 Limitations**

Since this paper only focuses on one of the four philosophical theories that make up the foundation of copyright law, the outcome of this paper might not be fully representative of what copyright law seeks to protect and achieve. Therefore, this paper’s findings are only a partial characterisation of what copyright law suggests about the ownership of AI art, and the other theories should also be explored to paint a fuller picture. Given more time, this paper could also have covered artworks done in collaboration with AI, rather than solely created by AI. This adds a new stakeholder (i.e. the human artist) to the list, which might affect the outcome of this research.

## **2. LITERATURE REVIEW**

### **2.1 Generative Adversarial Networks**

To better answer the question of who should own AI artwork, it is useful to first understand how AI art is created.

AI art is typically powered by GANs, “a potent class of neural networks that follow an intelligent approach to unsupervised learning” (Salehi et. al, 2020, p. 3). Their study found that:

GANs usually [contain] two neural networks to train and compete against each other: one generator and one discriminator. These two networks can be likened to counterfeiter (generator) and police (discriminator). The generator attempts to create a form of money similar to real-world money by learning the latest tricks to deceive the police, i.e., the discriminator. Conversely, the police must continuously update their information to spot counterfeit money. The two networks are continually updating their knowledge and getting feedback on their successful changes. This struggle continues until the police fail to distinguish real data from fake data; this means that the counterfeiter is generating valid [or plausible] samples. (p. 3-4)

### **2.2 Theoretical Foundations of Copyright Law**

As this paper discusses copyright protection of AI artwork, it is paramount to consider the philosophical bases of copyright law to arrive at a conclusion that is aligned with copyright law’s goals and objectives. This paper utilises Personality Theory, hence it would be focused on in this section. The three other theories and their tenets are also briefly sketched out to provide a broader perspective on the purpose of copyright law.

### 2.2.1 Personality Theory

Personality Theory “posits that property provides a unique or especially suitable mechanism for [self-actualisation], for personal expression, and for dignity and recognition as an individual person”, and “an idea belongs to its creator because the idea is a manifestation of the creator's personality or self” (Hughes, 1998, p. 28). Radin (1982) identifies the central tenet of Personality Theory to be that “to achieve proper self-development - to be a person - an individual needs some control over resources in the external environment" (p. 957). According to Personality Theory (p. 957), “the kind of control needed is best fulfilled by the set of rights we call property rights” (Hughes, 1998, p. 28), or in this case intellectual property rights.

The most well-known Personality Theory in the field of copyright is Hegel’s Theory of Property. Hegel’s (1821) main argument in *Philosophy of Right* is that “individuals have moral claims to their own talents, feelings, character traits, and experiences” (Hegel, 1821 as cited in Zalta, 2018, para. 28). For Hegel, “property is the embodiment of personality” (p. 59) and this embodiment is found in how “[a] person must translate his freedom into an external sphere in order to exist as an Idea” (p. 51), and by exercising one’s freedom on the external, one’s personality is expressed and the idea should belong to him or her. Hegel also writes that “property acquires the character of private property” (p. 55), and since personality is distinct, it is determined as what is immediately different and separable from the common, thus making the property the creator’s own.

### 2.2.2 Fairness, Welfare, and Culture Theory

In Locke’s (1690) *Second Treatise of Government*, he writes that an individual has a right to the product of their labour as the labour involved “added something to them more than

nature” and they “became his private right” (p. 12). In comparison, “cloaked in the notion of ‘[wealth-maximisation]’, the focus [of Welfare Theory] is to balance the social costs and benefits associated with giving legal effect to IP laws and rules” (Wilkof, 2014, p. 257). Culture theory, on the other hand, encourages “participation in culture for the sake of culture” (Cohen, 2006, p. 1198) and “[develops] a complex account of creativity that emphasizes the dynamic interactions between creators and the surrounding cultural context” (Hickey, 2016, p. 10).

### **2.3 Discussions Surrounding Copyright Protection of AI Art**

Scholars have argued how copyright should apply to the various contenders, with no discernible agreement.

With regard to the machine, Gillotte (2019) argues that “both the U.S. Copyright Office and scholars agree that computer programs may not own copyrights because software has no legal personhood and therefore cannot own property” (p. 2667). However, this argument might be limited in its application as many scholars have recently suggested that “autonomy, creativity, and spontaneous evolution of AI systems” might lead to the recognition of AI systems as possible independent legal entities that might be “entitled to legal and commercial rights and duties” (Chopra & White, 2011, as cited in Yanisky Ravid, 2017, p.684), which will be discussed further in Section 2.4.

On the protection of AI Art by programmers, it is traditionally believed that “[the] author responsible for the software behind the artificial intelligence would also be considered the author of resultant pieces of art” (Svedman, 2020, p.4). This view is supported by Miller (1993), who notes how “behind every robot there is a good person” (p. 1045), supporting “the

default view of programmers as the creators entitled to ownership of the works created by the AI systems they have programmed” (Denicola, 2016, as cited in Yanisky Ravid, 2017, p. 689). Yet, despite the seeming connection, Svedman (2020), relying on that latent theory of causation, suggests that “AI-created pieces of art lack the requisite causal connection to the upstream coders to justify a granting of copyright” (p. 4) because of how the AI system “develops in a black box” and “the coders fundamentally do not know how the system learns” (p. 5). She also notes how the programmers “do not control the instrumentality by which the final product is made” and rather only “cause the production by writing the starting code” (p. 5).

Another option outlined by Bridy (2012) would be to assimilate AI authorship “to the current copyright framework through the work made for hire doctrine” (p. 27), which is a mechanism for copyright accordance in which “an employer is considered the author even if an employee actually created the work” (United States Copyright Office, 2012, p. 1). Under such a model, copyright would be “[afforded] to the person who has commissioned the AI to create a particular work” (Ihalainen, 2018, p. 5). However, Huson (2018) argues that it is difficult to see AI as a valid employee as “the AI is not paid, there are no taxes, the AI does not control when and how long to work, there are no assistants, and the programmer may not be in business” (p. 74), contending that allowing a human to “automatically gain the rights of the AI’s works would incentivize ‘free-riding’” (p. 74).

#### **2.4 Legal Personhood for Machines**

In order to determine whether the machine exhibits signs of personhood, this paper will take into account Hubbard’s (2010) proposal for the accordance of legal personhood to AI systems. Although machines are not traditionally accepted as legal entities, Van Genderen

(2019) points out that “personhood in a legal sense is not carved in stone; there is elasticity of the concept due to the elasticity of societal needs” (p. 275).

With reference to “the nature and basis of the liberal theory of personhood” (Abstract section), Hubbard has suggested granting legal personality to an entity if it has the following capacities:

1. An ability to interact with its environment and to engage in complex thought and communication,
2. A sense of being a self with a concern for achieving its plan for its life, and
3. The ability to live in a community with other persons based on, at least, mutual self-interest. (p. 18)

#### *2.4.1 Interactions with One’s Environment*

Dennett (1988) argues that to be a “person”, one must have the ability to interact meaningfully with his environment by being “capable of verbal communication” (p. 178). While most machines are not capable of proper verbal communication, Hubbard resolves this by asserting that it is sufficient for “the entity’s communication with its environment” to be “diverse and sophisticated [enough] that we can view it as the product of complex thought” (p. 20). The machine must also be capable of “receiving and decoding inputs from its environment and by sending intelligible data to its environment”, displaying rationality and a capacity to “[learn] from its experiences in these activities” (p. 19).

#### *2.4.2 Selfhood*

Next, concerning a machine’s sense of self, Hubbard recognises that “robotic machines we experience today have goals”, but concedes that this is not sufficient and “the machine must

somehow care about the success of the plan” (p. 23) in order to be eligible for legal personhood. Doing so requires two emotional concerns, namely:

1. Care [for] its survival, and
2. A sense of what gives its life meaning (p. 23-24)

Essentially, machines “need to have dreams or visions of what they want to be and do in their lives and an understanding of how to plan and effectuate these dreams” (Hubbard, 2010, p. 21) to qualify for legal personhood under his model.

#### *2.4.3 Community*

Finally, in assessing whether an artificial entity is a member of a “community”, Hubbard adopts Rawls’ (1993) third definition of “community”, based on a *modus vivendi*. This category of “community” “requires that an entity have a sufficient ability to understand the human point of view concerning rights and duties within reciprocal relationships” (p. 30).

He does admit, though, that “currently, such displays of empathy are simulated emotions that are not related to feelings experienced by the robot” (p. 31). However, he goes on to argue that “even simulated emotions are sufficient so long as the machine’s [behaviour] is responsive to the humans’ reasons for engaging in the *modus vivendi*” (p. 31), noting how “understanding a human’s point of view and acting rationally in response to that perspective is sufficient” (p. 30).

### **3. METHODOLOGY**

This paper will utilise Hegel’s (1821) Personality Theory of Property to determine the owner of the copyright of AI art. However, Personality Theory has its limitations because it has always been applied to humans and used to assess human artworks, hence its definition of

personhood might be insufficient in our digital age. Given this limitation, a further theory is needed, and Hubbard's (2010) model, which maps out similar cognitive features and processes that traditional human artists possess, was thus chosen to determine GAN's eligibility for legal personhood. By understanding whether GANs meet the proposed criteria required for legal personhood according to the cognitive features in the creation process, we can better determine whether they demonstrate signs of autonomy, selfhood, and community as machines, and in turn decide whether they do or do not exhibit signs of "personality".

## 4. DISCUSSIONS

### 4.1 GANs' Eligibility for Legal Personhood

At first sight, GANs seem to adequately fulfil all three of Hubbard's (2010) criteria, qualifying for legal personhood under his model. Yet, the more minute details present within his proposed framework makes it difficult for GANs to fully fulfil the benchmark he puts forth.

#### *4.1.1 On Interactions with One's Environment*

First, GANs engage with their environment greatly when creating their artworks. As mentioned above, this process of creation is driven by the complex analysis and processing of tens of thousands of artworks, repeatedly synthesised and pitted in a generator-discriminator struggle in order to produce an original art piece. The pieces can thus be said to be influenced and affected by the machine's understanding of and engagement with existing pieces of artwork, or, in this case, its "environment". Additionally, such a creative process can be likened to human creators "actively interacting with their environment, especially via deep encounters with others' artworks", which as Okada and Ishibashi (2017, p. 1805) note, enable artists to "create their own original artworks and expression styles". In other words, artists are "often inspired by others' works when creating their own" - they analyse successful artworks and attempt to understand the reason for their success, they analyse the popularity of recent works of art to deduce the current trend, and they adapt ideas from others in the hopes of achieving the greatest success possible in their own artwork. GANs emulate this cognitive process extremely well - in order to produce a convincingly realistic piece, they would have to engage deeply with their environment, picking out useful trends and forming connections between pieces of information.

Moreover, GANs might, at first sight, seem to be able to continue interacting with their environments post-creation by communicating with human viewers. They are able to do this by attempting to interpret and mimic our human cognitive processes of perception and language through understanding the dataset they were trained on. For example, although our human use of colours while crafting an artwork (red depicts anger, yellow depicts happiness, blue depicts sadness, etc.) is not one that comes pre-programmed in a machine, GANs can infer and form their own associations for each colour by analysing thousands of artworks appropriately labelled with the right descriptions. This allows them to choose an appropriate colour for a certain context based on the mood they wish to create, highlighting a GAN's ability to understand the conventions in its environment and purposefully channel a certain emotion to viewers, thereby communicating with us.

Yet, despite seeming to fulfil the criteria set out by Hubbard, the machine seems to lack true "interaction" with us as human viewers. "Interaction" suggests a need for two-way communication, evident in Hubbard's requirement for machines to "receive" and "decode" inputs from its environment - one might argue that the machine does communicate with the viewer, for it has learned and tried to represent its ideas of the world in our language, yet the machine is currently still unable to process our human reactions to its work, resulting in a lack of a feedback loop required for interaction. Hubbard's model seems to be flawed in this aspect, for his requirement that machines interact reciprocally with humans limits our assessment of GANs as legal persons.

#### *4.1.2 On Selfhood*

As outlined in the Literature Review section, GANs train and operate through two sub-models - the generator and the discriminator models. In such a network, the two models continuously learn from each other; the generator is updated to get better at generating

plausible samples, and the discriminator is updated to get better at discriminating between real and fake samples. Both models, through their attempts to optimise different and opposing functions, push each other to improve with minimal human input. (Nicholson, n.d.; Goodfellow et. al, 2014; Brownlee, 2019)

In this way, GANs can be said to exhibit a sense of self and care for its success in life - there is a deliberate attempt and plan to achieve its goal of generating a plausible artwork, seen through how it trains itself continually in a bid to ensure the quality, originality, and tenability of its final artwork. It has a clear vision and sense of what it seeks to achieve, and actively works towards that with little human intervention so as to produce a successful artwork and prevent plagiarism as far as possible, sustaining its self and identity.

However, Hubbard's use of "emotional concerns" in his framework poses a challenge, for it is difficult for us to discern whether machines truly do care about the success of their artworks - they do show a clear direction in their "lives", but this direction was programmed and built into them by humans, raising questions about whether they truly possess this drive and direction on their own after all. In addition, "emotion" is difficult to quantify even in humans, and with the lack of an adequate proxy measure, determining a machine's care about the fame and prosperity of its artwork post-creation proves to be a challenge that can yet be solved.

#### *4.1.3 On Community*

In general, GANs exemplify their usefulness as members of their communities in how they are, at times, also used in partnership with human artists in the creation of artworks. Sun, et. al (2019), for example, presented a system that assisted graphic designers in their creation of icons. Their system involved the use of a dual conditional GAN, whereby two discriminators

were trained to “determine whether paired images are similar in structure and [colour] style, respectively” rather than to “[recognise] whether an icon is man-made or machine-generated”. In the system, human designers sketch contours to specify the structure of an icon and the system then colourises the contours according to the colour conditions and style specified. Both the human and the machine play an active role in the process - the human draws the icon, while the machine analyses its training set so as to colourise the presented icon in a realistic manner. In such a situation, GANs not only act in the interests of humans, but also become active members of the community, supporting and assisting artists in their creative journey. With the existing collaboration between GANs and human artists, there is no reason not to believe GANs will eventually be used by more and more human artists in the process of creation, illustrating GANs’ potential importance and role in the wider artistic community.

Nonetheless, Hubbard’s requirement for the machine to demonstrate “a sufficient ability to understand the human point of view concerning rights and duties” is difficult to satisfy as GANs are trained on datasets created by humans - each human has a different perspective on the significance of certain rights and duties. To draw an analogy, a dataset created by a white supremacist might cause the machine to invariably output a drawing discriminating against people of other races and backgrounds - in such a scenario, the machine does indeed understand a particular human’s view, but is unable to deem on its own whether a certain artwork would be offensive or insulting to the wider human populace. Due to the inherent prejudices held on to by certain human trainers, it is inevitable that a machine might craft an art piece that is not fully in line with the views and priorities of the wider community.

## **4.2 Manifestation of Creators' Personhoods in AI Art**

Given that, using Hubbard's model, it seems that granting copyright protection to AI systems is problematic on a few counts, a good way to understand how copyright might be accorded instead is to look at the human creators.

### *4.2.1 On the User*

Under Personality Theory, the users, the humans operating the AI system, do exhibit their personality adequately in the artwork produced. The users do play a notable role in commissioning, selecting, printing, marketing, and selling the final work (Epstein, et. al, 2020) - even though the machine played a major part in generating the artwork, the piece would never have made it to sale without the help of the user. While the programmers might be the ones who create the algorithm and the trainers the ones who craft and organise the training set, the users are the ones who choose which algorithm and dataset to use based on their goals and vision of the artwork to be created. The users are also able to adjust, modify, and set certain parameters so as to create an artwork most aligned with their needs. In addition, the machine usually outputs a set of multiple artworks based on the guidelines and specifications laid out by the users, and the users have to choose to either reject all the artworks created, or select one of them to publish and sell.

The users, at first sight, might seem not to be directly involved in the creation process as compared to the two other creators - the algorithm and the training set are, after all, the key parts in the making of the art piece. Yet, the artwork would never be able to come to fruition without the users, for they apply themselves and in turn their personalities on two fronts when creating the artwork: first, when selecting the algorithm, the dataset, and adjusting the AI system's parameters, and second, when hand-picking the final artwork for printing and

publishing. The manifestation of their individual personalities is significant because of how their unique traits influence the decisions they make when operating the AI system, eventually resulting in vastly different artworks being produced, with a close-to-zero chance of two users reaching and deciding on the same final artwork. The users' distinctive characters, priorities, and visions all affect the final outcome in one way or another, and their own personalities are embodied in the artwork through these very distinctions.

#### *4.2.2 On the Trainer*

Furthermore, the trainers play significant roles in the creation of AI art too, albeit one that may seem to be less direct and impactful than that of the user. Despite this typically more secondary role, the artwork produced can still be seen to adequately acquire the personality of the trainer, enough to accord it copyright protection under Personality Theory.

As indicated above, a central part of a GAN's self and identity is its training set(s). Trainers contribute crucially to this by providing and curating the dataset to be used. Through selecting specific artworks and translating their ideas of datasets into the physical world, trainers can be seen to apply their feelings and character traits, enabling them to express themselves and their personality to manifest. Each trainer has his or her own views on different pieces of artwork - it is not often that two individuals have the exact same opinion. Thus, even though the theme the training set is based on might be the same, the art pieces included may vary. These dissimilarities highlight the distinctive qualities and characteristics of each trainer, and may even reflect his or her intentions or feelings, which might greatly impact the machine's final output. In this way, the produced artwork can be seen to also be affected by and take on the personality of the trainer.

However, it must be noted that the significance of the trainer's involvement is lesser than that of the user itself, mostly because the trainer's personality manifests more in his or her dataset rather than the final artwork. While the artwork does indeed acquire part of the trainer's personality, this influence is diminished because the defining features of the final artwork are decided by the user, and in this, the significance of the intent of the trainer decreases and the personality of the user shines.

#### *4.2.3 On the Programmer*

Regarding the programmer, his or her personality manifests in the algorithm - the idea and general concept behind GANs stay the same, but each programmer has his or her own unique way of developing and designing his or her system. The algorithm, rather than the creation of the algorithm, is thus the product that embodies their personhood best. Some might argue that the programmer is the one who gives machines their seeming "personality" and the output generated from the computer programme is a derivative work product of the algorithm, which may then provide copyright protection to whoever holds copyright in the algorithm, but I argue that this is rather not the case. Under Personality Theory, there is a lack of a link between the programmer's personality and the final output - though each programmer's approach towards developing their own GAN algorithm might be different and in turn affect the artwork produced, these differences do not embody the personality of the programmer, noting how it is difficult to discern and distinguish the developer's individuality and identity purely from the differences in the final output alone. Hence, although programmers could be accorded the protection of their AI system, granting rights to programmers over their systems' creations were deemed to be inappropriate in this case.

## 5. CONCLUSION

Due to the jarring similarities the machine artist poses to the human one, the accordance of copyright protection has shown itself to be a difficult problem, one that was brought to light with the rise in GAN-fuelled AI artworks. This paper has proven its thesis, for it has shown how we are still unable to see the machine as a creator despite the presence of seemingly workable frameworks due to the humanlike requirements we still maintain in this day and age. This is so because copyright is still very much based on our human understanding of the human creator, making it difficult for machines to fulfil the requirements we set. Consequently, according copyright protection to the user and trainer of AI systems seems to be the most viable alternative.

Even though Hubbard's model seems reasonable and valid at first sight, our prevailing and enduring human standards are still displayed upon deeper inspection. The essence of his model - the cognitive processes he places emphasis on in his framework - is valid, but the intangibility of certain human aspects he still requires complicates our assessment of machines as valid creators deserving of copyright. There is thus a need for copyright laws to evolve to better encompass machines in our increasingly technological world, for the machine's ability to output "real" and plausible data suggests that there is still a creation process that we recognise and seek to protect. Due to the inadequacy of defining machines' processes using our current expectation of human creators, a more representative copyright model for machines still needs to be arrived at before such protection could be accorded, something which could be explored in future research.

By acknowledging the disadvantages while not dismissing the benefits of rapid technological development, we can integrate machines better into our society while staying grounded to the

core of our traditional value systems, hopefully creating a world in which innovation will continue to thrive and work towards the greater good of our human population.

## REFERENCES

- Bridy, A. (2012). *Coding creativity: copyright and the artificially intelligent author*. *Stan. Tech. L. Rev.*, 5.
- Brownlee, J. (2019, July 19). *A Gentle Introduction to Generative Adversarial Networks (GANs)*. Machine Learning Mastery.  
<https://machinelearningmastery.com/what-are-generative-adversarial-networks-gans>
- Chen, J. (2020, December 23). *Neural Network Definition*. Investopedia.  
<https://www.investopedia.com/terms/n/neuralnetwork.asp>
- Chopra, S., & White, L. F. (2011). A legal theory for autonomous artificial agents. *University of Michigan Press*.
- Cohen, J. E. (2006). Creativity and culture in copyright theory. *UC Davis L. rev.*, 40, 1151.
- Denicola, R. C. (2016). Ex machina: Copyright protection for computer generated works. *Rutgers UL Rev.*, 69, 251.
- Dennett, D. (1988). Conditions of personhood. In *What is a person?* (pp. 145-167). Humana Press.
- Epstein, Z., Levine, S., Rand, D. G., & Rahwan, I. (2020). Who gets credit for AI-generated art?. *Iscience*, 23(9), 101515.
- Gillotte, J. L. (2019). *Copyright Infringement in AI-Generated Artworks*. *UC Davis L. Rev.*, 53, 2655.
- Goodfellow, I., Pouget-Abadie, J., Mirza, M., Xu, B., Warde-Farley, D., Ozair, S., Courville, A. & Bengio, Y. (2014). Generative adversarial nets. *Advances in neural information processing systems*, 27.
- Hegel, G. W. F. (1821). *Philosophy of Right*. (Dyde, S. W., Trans.). London, United Kingdom: George Bell & Sons
- Hickey, K. J. (2016). Copyright paternalism. *Vand. J. Ent. & Tech. L.*, 19, 415.

- Hubbard, F. P. (2010). Do androids dream: personhood and intelligent artifacts. *Temp. L. Rev.*, 83, 405.
- Hughes, J. (1988). The philosophy of intellectual property. *Geo. LJ*, 77, 287.
- Huson, G. (2018). I, copyright. *Santa Clara High Tech. LJ*, 35, 54.
- Ihalainen, J. (2018). Computer creativity: artificial intelligence and copyright. *Journal of Intellectual Property Law & Practice*.
- Kinsella, E. (2018, October 25). *The First AI-Generated Portrait Ever Sold at Auction Shatters Expectations, Fetching \$432,500—43 Times Its Estimate*. Artnet News. <https://news.artnet.com/market/first-ever-artificial-intelligence-portrait-painting-sells-at-christies-1379902>
- Locke, J. (1980 [1690]). *Second Treatise of Government* (C. B. Macpherson, Ed.). Hackett Publishing.
- Meindertsma, J. (2014, May 9). *Theories of copyright | Copyright Corner*. Ohio State University Libraries. <https://library.osu.edu/site/copyright/2014/05/09/theories-of-copyright/>
- Miller, A. I. (2019). *The Artist in the Machine: The World of AI-Powered Creativity* (MIT Press) (1st ed.). The MIT Press.
- Miller, A. R. (1993). Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?. *Harvard Law Review*, 977-1073.
- Nicholson, C. (n.d.). *A Beginner's Guide to Generative Adversarial Networks (GANs)*. Pathmind. [https://wiki.pathmind.com/generative-adversarial-network-gan#:~:text=Generative%20adversarial%20networks%20\(GANs\)%20are,video%20generation%20and%20voice%20generation](https://wiki.pathmind.com/generative-adversarial-network-gan#:~:text=Generative%20adversarial%20networks%20(GANs)%20are,video%20generation%20and%20voice%20generation)

- Okada, T., & Ishibashi, K. (2017). Imitation, inspiration, and creation: Cognitive process of creative drawing by copying others' artworks. *Cognitive science*, 41(7), 1804-1837.
- Radin, M. J. (1982). Property and personhood. *Stanford Law Review*, 957-1015.
- Rawls, J. (1993). *Political Liberalism*. Columbia University Press.
- Salehi, P., Chalechale, A., and Taghizadeh, M. (2020). Generative Adversarial Networks (GANs): An Overview of Theoretical Model, Evaluation Metrics, and Recent Developments. *arXiv preprint arXiv:2005.13178*.
- Svedman, M. (2020). Artificial Creativity: A Case Against Copyright for AI-Created Visual Artwork. *IP Theory*, 9, 1.
- Turner, J. (2018). *Robot rules: Regulating artificial intelligence*. Springer.
- United States Copyright Office. (2012). *Works Made for Hire*.  
<https://www.copyright.gov/circs/circ09.pdf>
- Van Genderen, R. V. D. H. (2018). Do we need new legal personhood in the age of robots and AI?. In *Robotics, AI and the Future of Law* (pp. 15-55). Springer, Singapore.
- Van Genderen, R. V. D. H. (2019). Does future society need legal personhood for Robots and AI?. In *Artificial Intelligence in Medical Imaging* (pp. 257-290). Springer, Cham.
- Walker, V. (2020, January 16). *AI-generated art: who owns the copyright?* The Lighthouse.  
<https://lighthouse.mq.edu.au/article/december-2019/AI-generated-art-who-owns-the-copyright>
- Wilkof, N. (2014). Theories of intellectual property: Is it worth the effort?.
- 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. *Mich. St. L. Rev.*, 659.
- Yanisky-Ravid, S., & Liu, X. J. (2017). When artificial intelligence systems produce inventions: the 3A era and an alternative model for patent law.

Zalta, E. N. (2018, October 10). *Intellectual Property* (*Stanford Encyclopedia of Philosophy/Winter 2018 Edition*). The Metaphysics Research Lab, Stanford University. <https://plato.stanford.edu/archives/win2018/entries/intellectual-property/>