Pull a robot out of the hat:
Should works created by Artificial Intelligence
be protected by copyright law?

Alix Anciaux

The thinking machine has long been explored in science fiction.[1] *Terminator* or *Ex Machina* warned us that machines can only mimic, not feel, human emotions, suggesting that the close reality of machines exceeding human intelligence could lead to our demise. Machines do not yet rule the world, however, in the recent years, technological advancement in Artificial Intelligence ("AI") suggests that robots capable of replacing human creativity, ingenuity, and innovation are no longer a matter of fantasy.[2] It has been predicted that machines will have levels of intelligence equal, and often far superior to humans.[3] Machines can now display intelligent behaviours associated with creativity, including "appreciation, imagination, learning, intention and reflection",[4] making it nearly impossible to discern art made by humans from art made by computers.[5] Take *The Next Rembrandt*: knowing the artist's work, if one saw the portrait in a museum, one would think it was an original Rembrandt painting, but it was created by a facial recognition algorithm together with a 3D printer. One might expect that visual arts would be last thing computers could be good at, as they are abstract, expressive of one's personality, and tied to an individual culture and psychology.[6] Nonetheless, *AARON*, an autonomous AI system, paints abstract representations of objects and people on actual canvases, with real paint.[7] Thus, it seems that the involvement of AI in creative industries will grow in importance, and the commercial application of AI works will take place on a broader scale.[8]

Since its birth, subsequent to the invention of the printing press, copyright law has developed symbiotically with technological innovation.[9] From the invention of the camera to the rise of internet, allowing cheaper, faster and easier access to materials, copyright has managed to adapt.[10] That is, until now.[11] Copyright law was developed in a context in which new works were created directly by people. Copyright history is a *human* history, made by humans to serve individual-centric goals, as well as to promote the cultural and economic development of humankind.[12] The existence of AI challenges this reality, raising questions about the legal status of AI works. Could AI be copyright law's kryptonite?

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[1] Eg Asimov's Robot Universe (1950-1985), Star Trek (1987-1994), Her (2013).
[2] John Delaney,'Caucus for 115th Congress'<https://perma.cc/DHW6-7A24>accessed 11September 2020.
[3] Ryan Abbott,'Artificial Intelligence, Big Data and Intellectual Property: Protecting Computer-Generated Works in the United Kingdom' in Tanya Aplin (ed), *Research Handbook on Intellectual Property and Digital Technologies* (Edward Elgar Publishing 2020)3.
[4]'Creative AI: The Robots That Would Be Painters'(*New Atlas*, 16 February 2015)<https://newatlas.com/creative-ai-algorithmic-art-painting-fool-aaron/36106/>accessed 9September 2020.
[5] Kalin Hristov,'Artificial Intelligence and the Copyright Dilemma'(2017) IDEA 431,433–434.
[6] *ibid.*
[7] *ibid.*
[8] Andrés Guadamuz,'Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works'(2017) IPQ 169,175.
[9] Marshall Leaffer, *Understanding Copyright Law* (7th edn, CAP 2019)25–29.
[10] Jane Ginsburg and Luke Budiardjo,'Authors and Machines'(2018) 34 BerkeleyTechnLJ 343,346–353.
[11] Darin Glasser,'Copyrights in Computer-Generated Works: Whom, If Anyone, Do We Reward?'(2001) DLTR 1,1.
[12] Péter Mezei,'From Leonardo to the Next Rembrandt – The Need for AI-Pessimism in the Age of Algorithms' (2020) UFITA,11 (forthcoming).

This essay will attempt to answer the question of whether copyright should subsist in AI works, and, if so, who (if anyone) ought to be the author in the UK and in the US. The choice for a comparison between the UK[13] and US[14] copyright regime with regard to AI work stems from their contrasting views on human authorship, as well as divergence in the potential solutions available, in spite of their common origin in the 1710 Statute of Anne.[15] Further, UK copyright law is particularly interesting due to its partial harmonisation with EU law through international treaties,[16] as well as through directives[17] and judicial interpretation by the ECJ, in particular with regard to the concept of originality.[18] Yet, the historical and philosophical underpinnings of both regimes remain different.

This paper will begin by laying out the justifications for copyright law. After defining AI and the two types of AI works - AI-assisted and AI-generated works -, the overall desirability of the protection will be assessed. Then, this essay will analyse the existent law in the UK and the US, and scrutinise the solutions offered by the regimes. Lastly, this thesis will make a critical assessment of those laws, before making a normative evaluation: the current law is ill-suited to accommodate AI works, however, a departure from human creativity is unlikely and undesirable. Thus, a threshold of autonomy, together with a test of causation of originality is proposed to determine the protectability and authorship of AI works. This analysis will be done in light of two practical examples: *The Next Rembrandt* and *AARON*. The former is an AI-assisted painting with significant human involvement, and the latter is a strong AI machine created by a single person and which produces AI-generated works. Neither of these case studies have been tried in front of a court. While extremely relevant in their own rights, various topics touching upon the core legal aspects of AI fall outside the remit of this paper, including ethics, competition law or general regulation.

Chapter 1: Siri-ously, what is AI?

1.1 Justifications for copyright law

There is a great deal of academic debate about what is the best justification for copyright law. Bently and Sherman spoke about ethical and moral arguments, and instrumental justifications based on the fact that Intellectual Property induces or encourages desirable activities.[19] Craig and Keer mentioned the deontological (personality and labour) and teleological (utilitarian) theories.[20] Ravid recognised the theory of economics, personality and labour theory.[21] Fisher focused on utilitarianism and welfare, fairness, culture and social planning.[22] Two major lines of argument can be drawn out: the utilitarian and the natural rights justifications.

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[13] Law of England, Wales, Scotland and Nothern Ireland, governed by the Copyright, Designs and Patents Act 1988 (''CDPA1988'').
[14] Governed by the federal Copyright Act 1976 (''CA1976'').
[15] Jane Ginsburg,'A Tale of Two Copyrights: Literary Property in Revolutionary France and America'(1990) 64 TulLRev 991,998.
[16] Eg Berne Convention1886, TRIPS1995.
[17] Eg InfoSoc Directive (2001/29/EC), Database Directive (96/9/EC), Software Directive (2009/24/EC).
[18] Eleonora Rosati,'Towards an EU-Wide Copyright?(Judicial) Pride and (Legislative) Prejudice'(2013) IPQ 47.
[19] Lionel Bently and others, *Intellectual Property Law* (5th edn, OUP 2018)5,34-49.
[20] Carys Craig and Ian Kerr,'The Death of the AI Author'(Osgoode Legal studies research paper 2019),32–33.
[21] Shlomit Yanisky-Ravid,'Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era - The Human-like Authors Are Already Here - A New Model'(2017) MichStateLRev 659,699–707.
[22] William Fisher,'Theories in Intellectual Property Law' in Stephen Munzer (ed), *New Essays in the Legal and Political Theory of Property* (CUP 2001).

In practice, in common law, the dominant justification for copyright law is utilitarian.[23] On the other hand, continental jurisdictions focus on the natural rights justification.[24] It is noteworthy that no copyright regime is based on a single justification, but instead relies on a combination. Even where a country shows utilitarian trends, it will respect the personality of the author to some degree.[25]

1.1.1 Natural rights theory

The premise of natural right theories is that the law does not create a right, but merely recognises its existence,[26] justifying copyright predominantly according to the personality theory and Locke's labour theory. The former, developed by Hegel and Kant, focuses on the intellectual bond between the author and her work,[27] and claims that the author of a work is deserving of copyright protection as it reflects her unique personality, externalising her will.[28] Granting control over her work ensures that her ideas are not altered or misappropriated by unauthorised persons.[29] According to Locke's labour theory, copyright protection is granted to reward the author's dedication and hard work.[30] It allows the author to use the fruits of her mental labour, and to exclude others who may seek to benefit from them.[31]

At first glance, the natural rights theory seems unhelpful to justify the protection of AI works as the theory relies on the *intellectual* labour and the reflection of the creator's *personality* in the work. Personality implies an intention and desire to create which is foreign to machines.[32] AI's inherent lack of consciousness and emotions equally renders the "reward for effort" premise of the labour theory inapplicable.[33] However, the "emotional bond between the author and its work has loosened" with the death of the romantic author in the 21st century.[34] Moral rights now work more as indicators of the work's "subject, reliability and quality".[35] Working as a "trademark" of the creator of content, machines are able to exercise such rights effectively.[36] Nonetheless, one substantial obstacle remains: machines lack personality.[37] Even if an e-personality could be recognised, it is doubtful that machines would need any enforceable right to protect these moral *droits d'auteur*,[38] including the recognition of the creation or its integrity.[39] Yet, if we accept that the AI is an extension of the personality of its programmer or trainer, the natural rights theory may not be obsolete.

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[23] US constitution,ArtI§8cl8;Leaffer (n9)17–18.
[24] Leaffer (n9)17-18.
[25] Ginsburg,'A Tale of Two Copyrights'(n15)995.
[26] Ana Ramalho,'Will Robots Rule the (Artistic) World? A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems'(2017) 21 JIL 1,14.
[27] Mezei (n12)12.
[28] Justin Hughes,'The Philosophy of Intellectual Property'(1988) 77 GeoLJ 287,296.
[29] Abbott,'AI, Big Data and IP'(n3)10.
[30] Bently and others (n19)40.
[31] Craig and Kerr (n20)32.
[32] Ramalho,'Will Robots Rule the Artistic World'(n26)14–16.
[33] *ibid.*
[34] Anne Lauber-Rönsberg and Sven Hetmank,'The Concept of Authorship and Inventorship Under Pressure: Does Artificial Intelligence Shift Paradigms?'(2019) 14 JIPL 570,573.
[35] Florian DeRouck,'Moral rights & AI environments: the unique bond between intelligent agents and their creations'(2019) 14 JIPLP 299,303.
[36] Mezei (n12)18.
[37] *ibid.*
[38] *ibid* 17.
[39] Bruce Boyden,'Emergent Works'(2016) 39 ColumJL&Arts 377,391.

1.1.2 Utilitarian justification

The utilitarian theory rewards the person who "invested energy and hard work into the work".[40] Aiming to promote social and economic welfare,[41] the main goals of copyright are granting incentives for creation and encouraging dissemination.[42] Consequentialist theories fall under this umbrella, justifying the copyright system because it helps "foster the achievement of a just and attractive culture".[43] It seeks to grasp what society looks like and what role copyright law may play to best advance it, with a view to producing and distributing creative works.[44]

Unlike humans, AI machines need neither to be incentivised nor rewarded to run their code,[45] and create works,[46] at least as long as they are not endowed with consciousness.[47] However, human programmers need an incentive to invest the time and effort into creating, developing, and programming the AI.[48] Yet, they are already incentivised in the form of the copyright and possibly patent held over the software.[49] Further, machines have no means of reaping the economic benefits arising from copyright protection, as they are unable to assign the right to others[50] or make use of the exclusive rights deriving from authorship.[51] Nonetheless, utilitarianism seems to be less concerned with questions of humanness.[52] Instead, the model focuses on whether incentives are attributed and whether net social welfare is favoured thereof.[53] That is, whether the work is an important and valuable activity, allowing those who invested time and labour in producing the works to recoup their investment and reap a profit proportional to the marketability and popularity of the work.[54] Hence, utilitarianism seems to focus on the benefits received by the human audience by incentivising creation, rather than on the creator itself.[55]

Similar to the UK's legal position,[56] this thesis will advocate for a mix of both utilitarian and moral rights theories to justify copyright protection generally, allowing one to incentivise the right-holder to create and release the work whilst protecting the author of the work adequately. Regarding AI works, the argument that economic welfare incentivises culture adequately ought to be preferred. Notwithstanding, as will be argued in chapter 4, this does not mean that the core concepts of copyright law relying on humanity should be set aside.

All theories are inherently bound to the concept of authorship. Before focusing on this concept, the next section will attempt to define AI.

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[40] Mezei (n12)11.
[41] Christopher Buccafusco and Jonathan Masur,'Intellectual Property Law and the Promotion of Welfare'(2017) Public Law & Legal Theory No607.
[42] Daniela Simone, *Copyright and Collective Authorship: Locating the Authors of Collaborative Work* (CUP 2019) 21.
[43] Fisher (n22)4.
[44] Craig and Keer (n20)33.
[45] Robert Denicola,'Ex Machina: Copyright Protection for Computer-Generated Works'(2016) RutgersLRev 251,257.
[46] Daniel Gervais,'The Machine as Author'(2020) 105 IowaLRev 1,48 (forthcoming).
[47] Ramalho (n26)13–16.
[48] Hristov (n5)444.
[49] Pamela Samuleson,'Allocating Ownership Rights in Computer-Generated Works'(1986) 47 UPittLRev 1185,1199;Margot Kaminski,'Authorship, Disrupted: AI Authors in Copyright and First Amendment Law'(2017) UCDavisLRev 589,598.
[50] Samuelson (n49)1202.
[51] CDPA1988,s17-21;CA1976,§106.
[52] Kaminski (n50)598-599.
[53] Ana Ramalho, *The Competence of the European Union in Copyright Lawmaking* (Springer 2016)25–57.
[54] Bently and others (n19)42.
[55] Mezei (n12)12;Kaminski (n49)598-599.
[56] Ian Hargreaves,'Digital Opportunity: A Review of Intellectual Property and Growth'(2011),1.

1.2 Definition and types

"There are as many definitions of AI, as there are AI systems",[57] and the definitions vary according to the system at hand, its properties,[58] and the field of analysis.[59]

Samuelson defines AI as "a specialty field within computer science that is aimed at producing computers that exhibit intelligent conduct".[60] Similarly, Konar sees AI as "the simulation of human intelligence on a machine, so as to make [it] efficient to identify and use the right piece of 'knowledge' at a given step of solving a problem".[61] According to Russel and Norvig, AI can perform "activities that we associate with human thinking, activities such as decision-making, problem-solving, learning".[62] Thus, AI systems can think rationally and learn from experience and thus improve their performance over time.[63] Similarly, Kop classifies AI as a "non-human system that possesses cognitive function" and which can "think and plan strategically".[64] Ravid describes AI as a machine's ability to mimic human intelligence autonomously, but more efficiently than humans.[65]

In line with Ravid, Kehana and Abbott, this paper distinguishes between strong and weak AI, according to the algorithm's ability to perform operational variance.[66] Weak AI machines produce AI-assisted works, as they are only capable of decision-making to a limited extent and act under the command of a program installed and trained by humans.[67] Thus, they cannot deviate from their initial purpose.[68] Consequently, any creative spark imprinted in the work results from human input at some stage of the creative process, rather than computer input.[69] For example, even though the stakeholders could not exactly predict the final painting, the actions of the AI which produced *The Next Rembrandt* were the dictated by the programmers' and trainers' high involvement in the decision-making.[70] Conversely, a strong AI machine is capable, through deep learning,[71] of evolving and improving independently, creating new results unpredictable to its human creators,[72] who may not understand precisely how it functions or how the final output came about.[73] Consequently, AI-generated works are produced by computers which make most of the decisions involved in the creative process, without human intervention.[74] Essentially, this means that the generated output

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[57] Yanisky-Ravid (n21)673.
[58] Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach* (3rd edn, Pearson 2010), citing Bellman.
[59] Michael Jordan and Tom Mitchell,'Machine Learning: Trends, Perspectives, and Prospects'(2015) 349 Science Magazine 255.
[60] Samuelson (n49)1186.
[61] Amit Konar, *Artificial Intelligence and Soft Computing - Behavioral and Cognitive Modeling of the Human Brain* (CRC Press 1999)2.
[62] Russell and Norvig (n58)2.
[63] *ibid* 2–4.
[64] Mauritz Kop,'AI & Intellectual Property: Towards an Articulated Public Domain'(2020) 28 TIPLJ 1,4.
[65] Yanisky-Ravid (n21)681.
[66] *ibid*;Ryan Abbott,'I Think, Therefore I invent: Creative Computers and the Future of Patent Law'(2016) 57 BCLRev 1059;Eran Kahana,'Intellectual Property Infringement by Artificial Intelligence Applications'(2016) Stanford Centre for Legal Informatics.
[67] Guido Noto LaDiega,'Artificial Intelligence and Databases in the Age of Big Machine'(2018) AIDA 93,99.
[68] Kahana (n67)1.
[69] Daniela Simone,'WIPO Conversation on Intellectual Property in Artificial Intelligence Second Session'(2020).
[70] Mezei (n12)7.
[71] Gervais (n46)5–6.
[72] Yanisky-Ravid (n21)670.
[73] This is referred to as the "black box problem" *See* Ginsburg and Budiardjo (n10)405–408.
[74] Andres Guadamuz,'Artificial Intelligence and Copyright'(2017)<https://www.wipo.int/wipo_magazine/en/2017/05/article_0003.html>accessed 9September 2020.

lacks any direct causal connection with the human, as it is linked to the generative code.[75] For example, paintings created by *AARON* are produced without specific guidance from its creator. The machine has a high degree of independence, and Cohen himself acknowledged that he did not comprehend some of the processes generating the final outputs.[76]

In any AI system, there are three steps to its creation: (i) coding, (ii) input, that is, the training, either by the human or the machine itself, and (iii) the generation of the output.[77] The different stakeholders are therefore: the investor(s), the programmer(s) of the algorithm, the person(s) who trained it, the user, and the AI itself. Before trying to answer who is or ought to be considered the author, the desirability of the protection of AI works must be determined. To do so, the next section will assess the advantages and disadvantages of protecting AI works.

1.3 Desirability of copyright protection for AI works

Debate regarding the desirability of protecting AI works remains divisive. This essay will explore four main arguments.

Firstly, as AI machines produce work of value for society, it may seem natural to determine that a copyright regime ought to capture this value by granting economic rights in return.[78] Undoubtedly, *The Next Rembrandt* has artistic and technical value.[79] In *University of London Press v University Tutorial Press*,[80] the Court explicitly acknowledged that value ought to be protected by copyright, stating "if it is worth copying, it is worth protecting".[81] Protecting AI works can therefore incentivise developers and programmers to innovate, and positively benefit society. However, Gervais dismisses this argument by stating that there is no hard rule saying that the law must protect everything that has or may have value.[82] In fact, doing so would be a normative error.[83] Posner stresses that not all free-riding is illegal.[84] Examples of valuable, tolerated free-riding in the copyright regime include the defence of parody or satire, the creation of transformative works or the enrichment of the public domain.[85]

The second argument focuses on the need to protect AI works in order to level the commercial playing field.[86.] As a result of the failure of the regimes to address the AI problem, all AI works are free of copyright and compete on the same market as paid works, created by humans, who expect a financial return.[87] However, Ricketson rejects this argument by claiming that copyright objectives

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[75] DeRouck (n35)301.
[76] Jane Wakefield,'Intelligent Machines: AI Art Is Taking on the Experts'*BBC News* (17 September 2015)<https://www.bbc.co.uk/news/technology-33677271>accessed 9September 2020.
[77] Gervais (n46)5–7.
[78] *ibid* 13–14.
[79] Guadamuz,'Do Androids Dream of Electric Copyright?'(n8)1.
[80] [1916]2Ch601.
[81] *ibid* para610.
[82] Gervais (n46)13–14.
[83] *ibid.*
[84] Richard Posner,'Misappropriation: A Dirge'(2003) 40 HoustonLRev 621,622.
[85] Gervais (n46)14.
[86] *ibid* 15.
[87] Andres Guadamuz,'Should Robot Artists Be given Copyright Protection?'(*The Conversation*) <http://theconversation.com/should-robot-artists-be-given-copyright-protection-79449>accessed 9September 2020.

are not based on their commercial value, but on the protection of the fruits of human authorship.[88] As AI machines become increasingly creative, the doctrinal question of who the author is leads into the normative question of whether machines are capable of creating works of authorship: is authorship a human prerogative?

The need for authors to be human is a well-established assumption in national copyright regimes.[89] Indeed, the narrative of an author has historically been tainted by romanticism.[90] It is the idea of the individualistic author-genius, who is the sole and ultimate origin of a work embodying her personality[91] as she "moulds the work to her vision".[92] Originally, author's rights were defended on the grounds of human progress and the human spirit needing to grow and develop.[93] Creativity was then defined as the ability to experience one's self-consciousness.[94] Conversely, Levy and Boden characterise AI's ability to create new, valuable and unexpected output, and to deviate from rules as creativity.[95] Yet, Tushnet sees creativity as a virtue not due to the results, but rather the "process of making meaning contributes to human flourishing".[96] Therefore, the author's creativity stems from her humanity,[97] so a machine alone is not a source of creativity. Rather, it stems from the code written by the programmer, the trainer or the instruction provided by users operating the machine.[98] Whilst machines can do things we associate with creativity, it cannot stand as the real thing.[99] Even where creativity is not a prerequisite for copyright protection (such as in the EU), the work still ought to be original. As put by Mezei, "[o]riginality cannot be dehumanised, and cannot be lowered to cover non-human, algorithmic production of outputs – at least not without any good reason".[100] This paper will not argue that AI cannot be creative or produce original works, but that it is neither a source of creativity nor originality alone in the copyright sense.

Romanticism once dominated authorship and heavily influenced the current copyright regimes,[101] but many argue that the romantic author is dead, and that romanticism no longer offers a complete explanation of the law when determining copyright subsistence.[102] This "de-romanticising" of the author is a powerful argument for the recognition of rights to AI works.[103] Yet, removing the requirement of having a human behind the machine still seems practically impossible.[104] Consequently, the question is not whether an AI system may be the author of a work, but it is a matter of evaluating the authorial claims of the human stakeholders involved.

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[88] Sam Ricketson,'People or Machines: The Berne Convention and the Changing Concept of Authorship'(1991) ICC 1,33.
[89] Guadamuz,'AI and copyright'(n74)19.
[90] Craig and Kerr (n20)8.
[91] Simone, *Copyright and Collective Authorship* (n42)59.
[92] Jane Ginsburg,'The Concept of Authorship in Comparative Copyright Law'(2003) 52 DePaulLRev 1063,1092.
[93] Victor Hugo, *Discours d'ouverture Du Congrès Littéraire International* (2nd edn, Calmann Lévy 1878).
[94] Gervais (n46)35.
[95] David Levy, *Robots Unlimited: Life in a Virtual Age* (CRC Press 2005),151;Margaret Boden, *The Creative Mind: Myths and Mechanisms* (2nd edn, Routledge 2003),1.
[96] Rebecca Tushnet,'Economies of Desire: Fair Use and Marketplace Assumptions'(2009) 51 Wm&MaryLRev 51 513,537.
[97] Kaminski (n49)594.
[98] Ginsburg and Budiardjo (n10)401–403.
[99] Annemarie Bridy,'Coding Creativity: Copyright and the Artificially Intelligent Author'(2012) 5 StanTechLRev 1,para24.
[100] Mezei (n12)16.
[101] David Nimmer,'Copyright in the Dead Sea Scrolls: Authorship and Originality'(2001) 38 HoustonLRev 4015.
[102] Simone (n42)59–62.
[103] Bridy,'Coding Creativity'(n99)para5.
[104] Craig and Kerr (n20)42.

Importantly, rights and responsibilities are inextricably linked.[105] Granting authorship to AI is not desirable, as this would grant copyright to an author who cannot be held responsible, legally and socially,[106] for her work's meaning and content.[107] However, this legal black hole could perhaps be filled if the copyright of AI works were to be attributed to the human behind the machine in a form of liability by proxy.

Finally, this thesis will submit that copyright protection for AI only functions if some link with human originality can be maintained, thus being in line with copyright's goal of furthering *human* progress.

Chapter 2: Who is the author?

The first chapter has indicated that, at the international level, the author in copyright law is necessarily human. This chapter will address the current legal constructions working around this premise, and investigate the solutions offered by UK and US copyright law and whether these legal fictions can accommodate the protection of AI works. The solutions will be applied in light of the two case studies: *The Next Rembrandt* and *AARON*, which will be further introduced in the first section.

2.1 Contour de force: the AI painters

The *Next Rembrandt* project, sponsored by companies including ING and Microsoft, was carried out by a team of various experts, including data scientists, engineers and art historians.[108] Rembrandt's painting techniques, style and subject matter were studied in three steps. First, using 3D scans and a deep learning algorithm, Rembrandt's work was studied to create a database of 346 paintings.[109] Secondly, the AI system analysed the demography of faces in the paintings as to draw out common features, and defined the exact features to be produced by the painting. Then, the machine analysed and reproduced the technical and aesthetic elements of the painting, including the lighting, colours and brush strokes.[110] Finally, the paintings' height map, layers and textures were analysed and reproduced by the 3D printer to result in *The Next Rembrandt*, which, according to its creators, cannot be distinguished from a real Rembrandt.[111] Here, the stakeholders are: the investors, programmers, those who fed the data to the algorithm and selected the features of the new painting, and the user.

Born in the 1970s, *AARON* is an AI system generating paintings using its skills, knowledge and programmed imagination, without specific guidance from its creator, Harold Cohen.[112] Crucially, Cohen has never showed the algorithm any images, but fed *AARON* with descriptions, lists of objects and basic rules on the relationship between them, and it is programmed to paint in a

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[105] Gervais (n46)36.
[106] Robert Griffin,'The Changing Nature of Authorship: Why Copyright Law Must Focus on the Increased Role of Technology'(2005) IPQ 193,193.
[107] Gervais (n46)38.
[108] 'Can Technology and Data Bring Back to Life One of the Greatest Painters of All Time?'(*The Next Rembrandt*, 5 April 2016)<https://thenextrembrandt.pr.co/125449-can-technology-and-data-bring-back-to-life-one-of-the-greatest-painters-of-all-time>accessed 9September 2020.
[109] *ibid.*
[110] Guadamuz,'Should Robot Artists Be Given Copyright Protection'(n87)1.
[111] *The Next Rembrandt* (2016)<https://www.youtube.com/watch?v=IuygOYZ1Ngo>accessed 9September 2020.
[112] Harold Cohen,'Parallel to Perception: Some Notes on the Problem of Machine-Generated Art'(1973)<http://www.kurzweilcyberart.com/aaron/pdf/paralleltoperception.pdf>accessed 9September 2020.

particular style.[113] By increasing *AARON*'s knowledge over the years, Cohen enabled the AI to acquire the ability to paint in colour, draw forms and self-teach, though it cannot self-reflect.[114] Akin to a human artist, it evolved and improved over time. Its childish drawings became portraits of people and later, abstract representations of colour and shapes.[115] As *AARON*'s sole programmer, trainer and user, Cohen is the only stakeholder.

Both AI machines have produced an AI work, but who reaps the fruits of these creations? That is, who are the authors of *The Next Rembrandt* and *AARON*'s paintings? To answer this question, it is essential to first define an "author" in the UK and US jurisdictions.

2.2 Who is the author (if any) in the UK?

2.2.1 Authorship

S9(1) Copyright, Designs and Patents Act 1988 ("CDPA") describes an author as the person who creates the work. As inferred in *Walter v Lane*,[116] this requirement of creation links it to another key concept: originality. The author is the originator of the intellectual expression, the person from whom the skills, labour and/or judgement originate.[117] The concept falls somewhere between purely contributing ideas and mechanically fixing the work,[118] thus necessitating a modicum of creativity and intellectual input.[119] In *Donoghue v Allied Newspaper*,[120] the ideas of the article came from the jockey, but the report and how much was conveyed was the reporter's work, who was held to be the sole author. Yet, in *Cala Homes v Alfred McAlpine*,[121] Laddie J acknowledged that having "regard merely to who pushes the pen is too narrow a view of authorship […] It is wrong to think that only the person who carries out the mechanical act of fixation is an author."[122] Hence, the person who conceptualised and developed the idea for the house design and explained it not only verbally, but also through sketches was considered as a joint author of the subsequent plans produced.[123] The concept is facts-based and is, at least in theory, able to adapt to different creative contexts.[124] Further, special authorship rules apply to entrepreneurial works, and the requirement of originality is put aside to protect investment in creativity by deeming the producer, director, broadcaster of the work its author, rather than the creator.[125]

2.2.2 Joint authorship

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[113] 'Creative AI' (n4);Mark Anderson,'"Aaron": Art From the Machine'(*Wired,* 2001)<https://www.wired.com/2001/05/aaron-art-from-the-machine/>accessed 9September 2020.
[114] Harold Cohen,'AARON, Colorist: From Expert System to Expert'(2006)<http://www.aaronshome.com/aaron/publications/index.html>accessed 9September 2020.
[115] Chris Garcia,'Harold Cohen and AARON-A 40-Year Collaboration'(*CHM*, 2016)<https://computerhistory.org/blog/harold-cohen-and-aaron-a-40-year-collaboration/>accessed 9September 2020.
[116] [1900]AC539(HL).
[117] Bently and others (n19)127.
[118] Ginsburg and Budiardjo (n10)347.
[119] Simone (n42)17.
[120] *Donoghue v Allied Newspaper* [1938]1Ch106.
[121] [1995]EWHC7,[1995]FSR818.
[122] *ibid* 835.
[123] *ibid.*
[124] Daniela Simone,'*Kogan v Martin*: A New Framework for Joint Authorship in Copyright Law' 83 MLR 877,892.
[125] CDPA1988,s9(2).

For years, the UK courts have adopted a restrictive approach to joint authorship under s10(1)CDPA. This changed in 2019, with the Court of Appeal case *Kogan v Martin*, which set an inclusive pro-collaboration default standard, better suited than its predecessor to the current creative realities.[126] This new approach focuses on the four statutory requirements, which ought to be applied separately in spite of their interrelation.[127] (1) Beyond the question of "who did the writing",[128] there must be a *collaboration* between the parties to create a common design, an impact on each other's writings and shared labour in determining the general outline.[129] (2) *Authorship* is determined by contributing to the content of the expression, that is, concepts and emotions.[130] (3) The putative author must have *contributed* through expressing her "own intellectual creation",[131] in light of the specific creative content, displaying free and creative choices reflecting her personality.[132] (4) The contributions must be *non-distinctive*.[133] Critically, the Court implicitly rejected the requirement of subjective intent, and the "ultimate arbiter test".[134]

2.2.3 Solutions offered

The UK relies on a legal fiction to grant protection to the human behind the machine regarding computer-generated works (hereinafter "CGWs") under s9(3)cj.s178CDPA, treating the works as entrepreneurial work, acknowledging their commercial and technical nature. Where an authorial (literary, dramatic, musical or artistic) work has no human creator, the work is deemed to be authored by the person who undertook the arrangements necessary for its creation.[135]

Whilst the UK was seen as a forerunner in AI-related provisions, it fails to cover the widest range of AI-generated outputs.[136] "The person who makes the arrangement necessary" expects some kind of human intervention, and that AI be a tool rather than an autonomous entity.[137] Furthermore, it remains a mystery who such a person is in practice:[138] the one who fed the data to the AI, or designed the algorithm, or assembled the machine or the one who ran the AI and gave it a particular task, or an investor? Some or all of the above?[139] Moreover, the provision classifies CGWs as a distinct type of "work" but remains silent on how the originality of such works ought to be determined.[140]

Given the absence of case law on CGWs,[141] cases investigating authorship of films or sound recordings may be instructive. The producer, who is the person who made the arrangements

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[126] Simone (n42)63–71;Simone (n123)891.
[127] Julia *Kogan v Nicholas Martin* [2020]FSR3,[2019]EWCACiv1645,para111.
[128] *Kogan v Martin* (n127)para35.
[129] *ibid* para33.
[130] *ibid* para41.
[131] i*bid* para43, referring to CaseC-5/08 *Infopaq International v Danske Dagbldes Forening* [2009]ECRI-6569,para45.
[132] *ibid* para45, referring to CaseC-145/10 *Eva-Maria Painer v Standard Verlags* [2012] ECLI:EU:C:2013:138,paras87-91.
[133] *ibid* para47.
[134] *ibid* para61.
[135] CDPA1988,s9(3).
[136] LaDiega (n67)106.
[137] Mezei (n12)17–20.
[138] Ginsburg, *Concepts of Authorship* (n92)1070.
[139] Ramalho (n26)11.
[140] Bently and others (n19)117.
[141] The only authority is ambiguous and predates the existing law: *Express Newspapers v Liverpool Daily Post* [1985]3AllER680 *See* Guadamuz (n8)8.

necessary for the making of the film or sound recording, is deemed to be the author.[142] For films, courts focused on the organisational input of the person. In *Beggars Banquet Records v Carlton*,[143] this person was the one who financed and arranged access to the venue. In *Century Communications v Mayfair Entertainment*,[144] it was the person who initiated the making of the film and who financed it. Regarding sound recordings, the author is the person who is the "moving force", who eventually got the record made, as described in *Bamgboye v Reed*.[145] Applying this threshold to *The Next Rembrandt*, this would mean that the (legal)[146] persons who made the necessary arrangements are ING and Microsoft as they were ultimately responsible for funding.

Yet, this conflicts with the case law on computer games. In *Nova Productions v Mazooma Games*,[147] the plaintiff claimed copyright in the graphics and the frames generated by the software and displayed to the users of the video game. Kitchin J viewed the author as the one who produced (i.e. programmed and designed) the graphics and software, as opposed to the user, who did not contribute to "any skill or labour of an artistic kind".[148] Applied to *The Next Rembrandt*, this would make the author the teams of data scientists who provided the input to the algorithm or the programmer. Ultimately, who is making the necessary arrangements remains uncertain.

EU copyright law takes a different approach to originality, introduced through the Database, Software and Term Directives,[149] and developed in *Infopaq*, which threatens the viability of the UK's framework. In *SAS Institute v World Programming*,[150] the Court made clear that *Infopaq* may have added a layer of creativity to the UK approach, though the exact impact of the case on UK copyright law remains uncertain. *Infopaq* asked whether the reproduction of eleven-word snippets comprising eight words either side of a search team was a copyright infringement, that is, whether the snippets were original enough, given that the process was highly mechanised. The ECJ held that the standard of originality for authorial works was one of the author's "own intellectual creation",[151] as reflecting the author's personality and "personal touch" in her "free and creative choices" made.[152] Such choices cannot be dictated by "technical considerations, rules or constraints".[153] The *Infopaq* standard implicitly calls for a human author,[154] and *Football Dataco* explicitly excludes autonomous AI-generated works, which depend on technical rules and programming by a human being.[155] Dickenson explains that the standard could be stretched to include human beings using an AI program, but it is difficult, even impossible, to reconcile with copyright protection being given to works in which the creative process was started by a human being, but lacked a sufficient "personal touch" in the final output.[156] As a result, the EU's aim to harmonise the originality standard therefore largely threatens the applicability of s9(3)CDPA to AI works. This is supported by the decision by

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[142] CDPA1988,s9(2)(aa) and (ab)cj.s178.
[143] [1993]EMLR349.
[144] [1993]EMLR335.
[145] *Bamgboye v Reed* [2002]EWHC2922(QB),para86.
[146] S9(3)CDPA presumably covers legal and natural persons, given its entrepreneurial nature.
[147] [2007]EWCACiv2019.
[148] [2006]EWHC24(Ch),para106.
[149] *Infopaq* (n130)paras3-12.
[150] [2013]EWCACiv1482,paras36-37.
[151] *Infopaq* (n130)para51. Confirmed in CaseC-393/09 [2010]ECRI-13971,para46.
[152] *Painer* (n131)paras92,94.
[153] *Football Dataco v Yahoo!UK* [2012]ECLI:EU:C:2012:115,para39.
[154] Christian Handig,'The Copyright Term "Work" - European Harmonisation at an Unknown Level'(2009) IIC 40 665,668.
[155] Ramalho (n26)8.
[156] Julia Dickenson,'Creative Machines: Ownership of Copyright in Content Created by Artificial Intelligence Applications'(2017) 39 EIPR 457,459.

the European Parliament to remove of a section akin to s9(3)CDPA from the Software Directive proposal.[157]

2.3 Who is the author (if any) in the US?

2.3.1 (Human) Authorship

According to §102(a)cj.§201 Copyrights Act 1976 ("CA"), copyright protection subsists in original works of authorship, fixed in a tangible medium of expression. Case law provides further detail on this definition. In *Burrow-Giles Lithographic v Sarony*,[158] the defendant made lithographic copies of a portrait of Oscar Wilde. The Supreme court considered the author to be the originator of the expression, the "mastermind", by giving effect and embodying more than their detailed ideas and imagination into the work.[159] Sarony's selection and arrangement gave visible form to his own original "intellectual conception", so the portrait was protectable.[160] In *Lindsay v RMS Titanic*,[161] the film director was considered its author, as he extensively planned and had a high degree of control over all elements of the film's operation, which itself reflected his vision, even if he did not physically contributed to the making of the film by holding the camera.

One notable exemption to the rule that the owner of a work is its author is the "work-made-for-hire" doctrine (hereafter "WMFH"), which requires that the employee creates new works within the scope of employment.[162] In such case, the employer (or another person for whom the work was prepared) is considered to be both author and the owner of the work, allowing the employer to gain copyright over a work resulting from a creative process they did not have a direct role in.[163] Rooted in the notion of control and agency,[164] this facilitates the exploitation of works and encourages investment in works created by an agent.[165]

The concept of authorship is intertwined with originality and a "modicum of creativity".[166] In *Feist publications v Rural Telephone Service*,[167] the Court rejected the "sweat of the brow" doctrine, ruling that skills, labour and judgement do not alone constitute an original work. This threshold is low, requiring an independent creation above a *de minimis* quantum of creativity, but it is there.[168] Putting together a telephone directory was a "commonplace" and "entirely typical" compilation of facts, arranged sensibly, in a way that required no creative input, so it was not protectable.[169]

There is no provision similar to s9(3)CDPA within the CA. On the contrary, the US Copyright Office has inferred a requirement of human input to grant authorship. Thus, "works produced by machines or mere mechanical processes that operates randomly or automatically without any creative input

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[157] Thomas Dreier,'The Council Directive of 14 May 1991 on the Legal Protection of Computer Programs'(1991) EIPR 319,321.
[158] 111US53(1884).
[159] *ibid* 58,61.
[160] *ibid* 61.
[161] 52USPQ2d1609 (SDNY 1999).
[162] CA1976,§201(b).
[163] Glasser (n11)4.
[164] Restatement of the Law (Second) of Agency 1958.
[165] Ginsburg (n90)1088–1089.
[166] Russ VerSteeg,'Rethinking Originality'(1993) 34 Wm&MaryLRev 801,821.
[167] 499US340 (1991).
[168] *ibid* 362.
[169] *ibid*.

or intervention from a human author" are not protectable by copyright.[170] This stems from the notion that computers are considered as mere tools to facilitate human creativity,[171] which is not explicitly prescribed in the legislature, though precedent seems to infer it. In *Goldstein v California*,[172] the Supreme Court interpreted authorship as "the physical rendering of the fruits of creative intellectual or aesthetic labour".[173] *The Trade-Mark Cases* describes this as occurring in the "creative powers of the mind" and visible in the work's selection and arrangement.[174] In *Burrow-Giles*, the author of the photograph had to prove the existence of "intellectual production, thought and conception".[175] Samuelson optimistically stated in 1986 that "it can […] only be a matter of time before courts are forced to resolve the issue",[176] but Ramalho argues that the pre-requisite of humanness for authorship was reaffirmed in *Naruto v Slater*[177] as the Ninth Circuit Court referred to "human beings" or "persons".[178] Furthermore, previous jurisprudence tied non-human entities (spiritual[179] or celestial beings[180]) to a human author acting as amanuensis, as a sufficient nexus to human creativity in compiling, coordinating and arranging the work was found.[181] The Court reasoned that whilst theoretically possible, works produced by non-human agents are not something copyright ought to protect.[182] In *Alfred Bell v Catalda Fine Arts*,[183] where the defendant threw a sponge at a canvas out of frustration, the Court recognised that the author may incorporate random external forces, as long as they are bent to her will.[184] Notwithstanding, Ramalho calls this human requirement "clear and unescapable".[185] Neither legislation, jurisprudence, nor literature gives clear indications about what counts as sufficient human creative input for copyright protection. Whilst this leaves room for interpretation,[186] it seems unlikely to allow an interpretation that encompasses works independently and autonomously created by a machine, given the minimal, even absent, human output involved.

2.3.2 Joint authorship

Joint Authorship is defined according to §101CA and requires (1) the intention of the authors to (2) merge their contributions into inseparable and interdependent parts of a unitary whole. The requirement for explicit intention has become increasingly important, and the core of the ever narrower approach is a requirement of ultimate control over the creative process.[187] Courts have been persuaded by objective manifestations of intent[188] showing that the person is the mastermind, the person who superintended the work, regardless of whether the person contributed to the creative

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[170] Compendium of US Copyright Office Practices,§313.2 (not binding but indicative);CONTU,'Final Report on the National Commission on New Technological Uses of Copyrighted Works'(1981).
[171] CONTU (n170)44-45,110.
[172] 412US546 (1973).
[173] *ibid* 561.
[174] 100US82 (1879)94.
[175] *Burrow-Giles* (n158)60.
[176] Samuelson (n49)1190.
[177] 888F3d418 (9thCir 2016).
[178] Ramalho (n26)7.
[179] *Cummins v Bond* [1927]1Ch167;*Urantia Foundation v Maaherra* 114F3d955 (1997)957-958.
[180] *Penguin Books v New Christian Church* 55USPQ2d (SDNY 2000).
[181] Bridy (n99)para48.
[182] *Urandia* (n179)959.
[183] 191F2d99 (2dCir 1951).
[184] Ginsburg and Budiardjo (n10)368.
[185] Ramalho (n26)6.
[186] Guadamuz (n8)15.
[187] Simone (n42)33.
[188] *ibid.*

expression.[189] Furthermore, in *16 Casa Due v Merkin*,[190] mere control over the creative, but not managerial, aspects of a film was not enough to amount to authorship. Evidently, this approach favours individual, over joint, authorship,[191] and poorly reflects the current realities.

The contribution of one who acts as a faithful agent and carries out tasks as instructed, injecting no alteration of her own, is not a joint author.[192] A principal contributor exercising a "high degree of control over the process of creation"[193] may outsource acts of execution to agents (and remain the sole author) as long as she limits how the agent carries out her task.[194] However, a person may be a joint author where they devise their own creative plan and the instructions offered no more than a general idea.[195]

2.3.3 Solutions offered

Bridy and Ravid put forward a model that relies on an analogy of the machine as an author, employed to create,[196] in short, a broader version of the WMFH doctrine.[197] The proposed model ensures that the employer (programmer or user) maintains the appropriate rights and duties with regard to the AI work, next to acknowledging the needlessness of granting economic rights to machines, as they do not need to be incentivised, nor are they able to authorise licensing of the works.[198] This theory facilitates consideration of the human-like features of the AI, instead of disregarding them, and looks directly at the human behind the machine,[199] without making a normative judgement as to which candidate is more worthy of authorship.[200] Further, it aligns with the utilitarian justification to incentivise all efficient use of creative and autonomous AI systems, next to enhancing the commercial value of the produced outputs.[201]

On its face, the idea seems to reconcile all problematic issues with regard to AI: humanness, responsibilities, and justifications.[202] However, this approach is incompatible with the existing doctrine and would thus require a substantial change in the law.

Such a change would also entail recognising that AI works may be copyrightable even when not produced by humans. Yet, one cannot simply separate the doctrine from the premise of human authorship and creativity. As argued in section 1.3, this is neither compatible, nor desirable in the current copyright regime, and would run counter to obligations under the Berne convention.[203] Furthermore, allowing for such an interpretation would flip the purpose of the doctrine on its head. Its original aim is to grant a (natural or legal) person rights in a work created by humans, not to

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[189] *Aalmuhammed v Lee* 202F3d1227 (9thCir 2000).
[190] 791F3d247 (2dCir 2015).
[191] Simone (n42)70–71.
[192] *Adrien v Southern Ocean* 927F2d132 (3dCir 1991).
[193] *Lindsay* (n161)4-5.
[194] Ginsburg and Budiardjo (n10)355.
[195] *ibid* 348.
[196] Yanisky-Ravid (n21)707-718;Bridy (n99)paras66,67.
[197] This solution would only be available in the US, given that s11CDPA only vests ownership in the commissioner/employer, but the employee remains the author.
[198] Yanisky-Ravid (n21)716–718.
[199] *ibid.*
[200] Bridy (n99)para66.
[201] Gervais (n46)18–21.
[202] Hristov (n5)447-452;Craig and Keer (n20)35.
[203] Ricketson (n88)29.

anthropomorphise both actors. Thus, this theory would stretch the doctrine far beyond its original meaning, and result in breaking the necessary link between rights and responsibilities.[204] The essential requirements of having an "author" and a hired "employee" (or a "commissioned work")[205] are missing in an AI environment, and inescapably so.[206] Implementing the proposed doctrine would necessitate broadening the concepts such as to effectively include all freelancers,[207] and would essentially pigeonhole AI into an unsuitable legal category.[208] AI cannot be compared with a legal person, as the latter maintains this essential link with humans.[209] Furthermore, the costs associated with being the user of an AI system, as opposed to scouting, finding and training an employee, cannot justify the change in legal landscape.[210] It is worth mentioning that this model would over-reward the right-holders by protecting unlimited outputs generated by the machine,[211] and it would essentially grant copyright in the hands of a handful of players, thereby hindering consumer welfare.[212]

Another solution sees the AI as a human's agent.[213] Some believe that even strong AI machines such as *AARON* are incapable of "embarking upon a frolic of [their] own",[214] even if they can program and modify their own codes.[215] This reasoning is based on the idea that the even the programmed randomness is dictated by stakeholders.[216] I find this argument unconvincing, as copyright should not protect works which have gone past having a direct link to human creativity, as opposed to works where humans retained influence in selecting, coordinating and arranging the work, dictated by spiritual forces.[217] As soon as a machine can make autonomous decisions, the stakeholders' role loses control over the process of creation.

Relying on derivative works[218] is not a viable option to solve the AI authorship problem. Firstly, a derivative work is "based upon one or more pre-existing works",[219] and the second work must incorporate protected elements of expression from the first work.[220] Since the AI does not incorporate the code that produces it, this dismisses the possibility that the generated output is based on a pre-existing work.[221] Even if it could be treated as such, the authorship problem would remain unsolved, as copyright is only warrant to the parts added to the original work, and does not affect this first copyright.[222] Additionally, this essay dismisses Butler's argument of "human

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[204] Gervais (n46)46.
[205] CA1976,§101.
[206] Timothy Butler,'Can a Computer Be an Author – Copyright Aspects of Artificial Intelligence'(1982) 4 HastingsCom&EntLJ 707,741;Glasser (n11)para14;Bridy (n99)para68.
[207] Aviv-Hertez Gaon,'Artificially Intelligent Copyright: Rethinking Copyright Boundaries'(York University 2019)279.
[208] Craig and Kerr (n18)21.
[209] Ramalho (n26)17.
[210] Yanisky-Ravid (n21)714–716.
[211] Samuelson (n49)1208.
[212] Victor Palace,'What If Artificial Intelligence Wrote This? Artificial Intelligence and Copyright Law'(2019) FloridaLRev 217,236 and 238.
[213] Ginsburg and Budiardjo (n10)402-404,417-418.
[214] *Joel v Morison* [1834]EWHCKBJ39.
[215] Zachary Lipton,'The Myth of Model Interpretability'(*KDnuggets*)<https://www.kdnuggets.com/the-myth-of-model-interpretability.html/>accessed 10September 2020.
[216] Matthew Scherer,'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies and Strategies'(2016) 29 HarvardJL&Tech 354,366;Ginsburg and Budiardjo (n10)404.
[217] *Penguin* (n180)1680,1689;*Urantia* (n179)958.
[218] Samuelson (n49)1209-1211.
[219] CA1976,§101.
[220] Samuelson (n49)1215.
[221] Bridy (n99)25–26.
[222] CA1976,§103(a).

presumption" that if a work created by a machine is indistinguishable from a work created by a human author, then the work ought to be protected by copyright.[223] This would require a judge to assess the human potential of a work, and would amount to a test on aesthetic merits, which has consistently been rejected.[224]

2.4 Which system, if any, is better suited for AI works?

As a result of the lack of international harmonisation of the authorship concept, the UK and the US deal with authorship of AI works in contrasting ways.

UK courts have interpreted authorship as encompassing works which were not made as a result of creative choices, as the general rule prescribes, but which made a socially valuable contribution to society.[225] Unsurprisingly, the UK treats authorial CGWs as entrepreneurial works, by deeming the author of the work to be the person who made the "arrangements necessary" for the creation of the work.[226] However, this solution does not add much. It creates substantial legal uncertainty[227] and "constitutes a reason not to extend the applicability of this legal fiction".[228] Moreover, Gervais argues that "copyright law is not an investment protection scheme".[229] Since paintings remain artistic and creative works, should they be distanced from originality and its inherent link to human creativity? This conception is challenged by the EU standard of "own intellectual creation", which requires the reflection of human intellect in the work to recognise its copyright protection.

Conversely, the US grants authorship to those who have instigated or invested in a creative project, and excludes those who made creative choices, but lacked control over the creative process.[230] It is surprising that the US copyright regime allows no room for authorship where the output is made by an entity other than a human, such as natural[231] or spiritual forces,[232] when at other times, a creator is able to adopt the product of these forces as their own and attribute their authorship as her own.[233] This raises the question of whether human creators may adopt choices made by the machine as their own, and if so, which stakeholder should take credit for those choices.[234]

To be considered joint authors, the US requires intention to merge contributions.[235] In contrast, such romantic requirement of subjective intention was rejected in the UK, requiring merely a loose plan or some common design between contributors in order to be joint authors.[236] As will be explained in section 4.1, this requirement of intention creates substantial problems in framing a test allowing for joint authorship of AI works.

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[223] Butler (n206)746;Bently and others (n19)117.
[224] *Bleistein v Donaldson Lithographing* 188US239 (1903). The same reasoning precludes an application of the principle in UK law *See* CDPA1988,s4(1)(a) and CaseC-683/17 (*'Cofemel'*)[2019]ECLI:EU:C:2019:721.
[225] *Walter* (n115).
[226] CDPA1988,s9(3).
[227] Guadamuz (n8)8.
[228] Ramalho (n26)11.
[229] Gervais (n46)41.
[230] *Aalmuhammed* (n189);*16 Casa Merkin* (n190);*Hadley v Kemp* [1999]EMLR589.
[231] *Kelley v Chicago Park District* 653F3d290 (7thCir 2011).
[232] *Penguin* (n180)1680,1689;*Urantia* (n179)958.
[233] *Bell* (n183)8.
[234] Simone,'WIPO Conversation'(n69)2.
[235] *Thomson v Larson* 147F3d195 (2d Cir 1998),paras203-204.
[236] *Kogan v Martin* (n127)para53.

In sum, the US system is poorly prepared to deal with AI works due to its strong resistance to acknowledge non-human authorship and its ambiguous case law on authorship including forces outside the remit of strict human control. Whilst it may not be adequate, the UK provision on CGW certainly suggest a well-intentioned desire to adapt the copyright regime to the AI challenge. However, this essay questions the desirability and benefits of protecting artistic works which make independent and autonomous decisions without requiring any human input.

Chapter 3: Implications of a change (or not) in the law

Having gleaned valuable insight from the current laws, this paper will make a normative assessment of the challenges faced by these frameworks.

3.1 Different actors contending for authorship

Which actor ought to be the author of a work remains a very challenging question, particularly as most stakeholders involved in the process of creating the AI do not meet the threshold of authorship individually. This assessment requires balancing of copyright justifications, legal constraints, as well as ethical, social and cultural dimensions. In any event, putting authorship in the hands of anyone who gets close to the AI could void the concept of authorship of its meaning.[237]

Granting authorship to the programmer is tempting, easy and seemingly intuitive. After all, it is only fair to reward the person who created the work and invested time and effort into the algorithm, especially since, without her intervention, the work could not have been created.[238] This also incentivises further development and production of AI programs.[239] However, the autonomous and independent nature of strong AI breaks the necessary link with the programmer's creativity required to justify authorship. At this point, the incentives and rewards for the generated work lie in the AI machine itself, which has little need for an additional push than an instruction to create the work.[240] Thus, the programmer only creates a potential for the creation of the output.[241] Moreover, there is a growing debate on the nature of the programmer's contribution, and if, where too much control over the execution of the work is surrendered, it constitutes more than a general idea.[242] We do not deem the person who invented the paint brush or manufactured it to be entitled to the copyright in the resulting paintings. Similarly, copyright protection is neither granted to the person who taught the painter how to paint, nor to the parent who raised her. They only aided in the conception of the child/painting, not in the creation of the work. Consequently, the trainer of the algorithm is also unable to claim authorship of the AI-generated work, due to the remoteness of the creative choice in the creative process of selecting the training data.[243] For AI-assisted works, a link does remain between the programmer and the output. Regarding *The Next Rembrandt*, the programmers understand how the algorithm works and can explain the creative process which led to the creation

[237] Simone (n42)30.
[238] Samuelson (n49)1265.
[239] Mark Perry and Thomas Margoni,'From Music Tracks to Google Maps: Who Owns Computer-Generated Works?'(2010) 26 CLSR 1,23.
[240] Kop (n64)8.
[241] Samuelson (n49)1209.
[242] Ginsburg and Budiardjo (n10)364.
[243] Simone (n69)3.

of the output, and made decisions on the characteristics of the resulting painting.[244] This more direct link between human and output enables the application of current rules on authorship possible. Yet, one problem remains in jurisdictions which have a requirement of fixation, like the US: the programmer or trainer are not responsible for the fixation of the work, as it is dependent on the intervention of the user or the randomness built into the algorithm.[245] Luckily, joint authorship may resolve this, although this solution is not straightforward, as the current test creates additional obstacles (see section 4.2). Moreover, granting protection solely to the programmer or the trainer (alone or jointly) may lead to protectionist measures restricting third parties from using the AI, leading to a decrease in the production of AI works.[246]

The user of the machine is not a better option. The basis for a user authorship claim is the use of the machine as a tool to express her creativity, through giving instructions,[247] as a painter chooses the colours and applies them on the canvas. This could work since copyright law does not impose a requirement of uniqueness, ingenuity or novelty,[248] and cannot make a judgement on the aesthetic quality of the work.[249] Yet, as soon as the user's involvement is limited to a click of a button and the machine is autonomous, it is hard to consider the work original, depicting the user's own creativity and individualism.[250] While the click of a button does not stop the photographer from gaining copyright over her photograph, strong AI's autonomy and unpredictability distinguishes it from the operation of a camera. Conversely, Samuelson lays down doctrinal reasons for allocating authorship rights where the user's contribution is minimal as it gives her incentives to operate the program and produce new works.[251] However, allowing such a claim would not only diminish the incentives for the programmers to create AI algorithms, but it would deter innovation and technological progress, which would be inhibited by a fear of free-riding.[252] Moreover, in the US, the separation of the requirements of execution and conception is problematic. Indeed, the user misses the element of control or creative choice in the process, performed by the programmer or trainer.[253]

Lastly, the option of attributing authorship to the investors behind the machine has not been explored in the literature, though, as described in chapter 2.2.3, it is a possible interpretation of s9(3)CDPA. Is granting protection for an investment that does not figure in the final output the right approach to foster a more efficient and wealthier society? To what extent can a balance between human creativity and technology be sought within the boundaries of copyright law? Is it desirable to follow the UK's view and break the essential tie between authorship and originality in authorial works? Would a (lower) entrepreneurial protection, not requiring any originality or creativity, sufficiently protect artistic AI works so to generate the necessary incentives to create and disseminate the works? Evidently, to protect AI works would go beyond adapting the concept of authorship: the requirements for copyrightability also cover originality, subject matter, economic and moral rights, limitations and exceptions and term of protection.

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[244] Perry and Margoni (n239)10.
[245] Andrew Wu,'From Video Games to AI: Assigning Copyright Ownership to Works Generated by Increasingly Sophisticated Computer Programs'(1997) 25 AIPLA 131,171.
[246] Hristov (n5)444–445.
[247] Samuelson (n49)1203.
[248] *Burrow-Giles* (n158)paras58-59;*Bell* (n183)para17;*University of London Press* (n80)609-610.
[249] Samuelson (n49)1198.
[250] James Grimmelmann,'There's No Such Thing as a Computer-Authored Work – And It's a Good Thing Too'(University of Maryland 2015) 2016-06 421;Perry and Margoni (n238)18.
[251] Samuelson (n49)1203.
[252] Emily Dorotheou,'Reap the Benefits and Avoid the Legal Uncertainty: Who Owns the Creation of Artificial Intelligence?'(2015) CTLR 85.
[253] Ginsburg and Budiardjo (n10)11.

A number of questions remain unanswered. What amount and what type of human input is necessary to establish authorship? At which stage of the creative process should this human contribution be made? In cases like *The Next Rembrandt*, with multiple human inputs at different stages of the creative process, what kind of relationship must the contributors have to establish joint authorship?

3.2 Potential for a change

To grant the stakeholders' authorship in all AI works, one would need to abandon the current hallmark of authorship, or at the very least, create special rules in order to recognise a concept of "machine authorship". Those changes are unlikely in both copyright regimes examined, especially since the US Congress and the European Parliament have repeatedly reaffirmed that the basic copyright principles maintain their relevance in the context of new technological environments.[254] However, academics argue that a change in copyright law is necessary.[255] Hristov suggests that the current *status quo* may discourage innovation and the creation, use or improvement of AI machines.[256] Further, Denicola believes that it is socially desirable to protect emergent works as the public welfare relies not on the process that produced the work, but on the work itself.[257] Yet, according to Mezei, today "there are more convincing arguments against than in favour of the protection" of AI works.[258]

As argued by Kop and Mezei, empirical evidence of the social, cultural and economic value of AI works, is required before vesting them with a level of protection equivalent to humans works. There must be policy arguments, doctrinal clarity and sufficient justification to protect them.[259] It must be shown that such protection is needed to create an incentive to "create, produce and invent".[260] Further, whilst this dissertation built its own definition of what AI is on the basis of the available literature, regulating a phenomenon with no defined terminology is nearly impossible.[261]

Another concern relates to the legitimacy of a rejection of protection on the basis of the source. If no one knew that the outputs were AI-generated works, they would be protected by copyright law, provided that the formalities were met.[262] Does the manner in which works were created matters if the copyright incentives of encouraging the production and distribution of socially valuable works endure?[263] This calls for a reassessment of the justifications of copyright: does it play an truly utilitarian role in society by "encouraging the production and distribution of new works, irrespective of the manner in which they were created"?[264] If the utilitarian justification is concerned with the benefits received by the human audience, focusing on the incentives of the creation, rather than on

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[254] CA1976,§102(a) (revised in 2020);European Parliament, Resolution of 16 February 2017 on Civil Law Rules on Robotics [2015] 2015/2103(INL)para18.
[255] Hristov (n5)452-453;Denicola (n45);Bridy (n99)25;Leaffer (n9)109.
[256] Hristov (n5)438-439.
[257] Denicola (n45)273.
[258] Mezei (n12)13.
[259] Mezei (n12)7-8 and 21.
[260] Kop (n64)8.
[261] Jan Zibner,'Artificial Intelligence: A Creative Player in the Game of Copyright'(2019) 10 EJLT 1,8.
[262] Josefien Vanherpe,'AI and IP - A Tale of Two Acronyms' in Jan De Bruyne, *Robots, AI and the Law in Belgium* (Intersentia 2020),12.
[263] Toby Bond and Sarah Blair,'Artificial Intelligence & Copyright: Section9(3) or Authorship without an Author'(2019) 14 JIPLP 423.
[264] *ibid.*

the creator itself,[265] then AI works ought to be protected. These are all legitimate questions, but, as explained in section 2.3.3., do not take into account the ultimate goal of copyright law: human progress.[266]

Chapter 4: Proposal

This chapter puts forth proposal for a framework that, under the current law, will address the above concerns.

The algorithms behind *The Next Rembrandt* produced a portrait not resembling any real person, bound to the programmers' decisions and resulting from the training and data input. *AARON*, a strong AI machine, on the other hand, autonomously produced an output through a process which was unpredictable and unknown to Cohen. The key concept here is *autonomy:* when does a machine gain so much autonomy as to separate itself from its human creator, and hence, escape the realm of copyright protection? And what happens when this threshold is crossed?

4.1 Autonomy threshold

I wish to propose a framework which could be applied today, without requiring a change in the legislation enabling it to adapt to the fast-changing nature of AI.[267] A change in the law would struggle to balance societal impact and technological progress and development,[268] and could be counter-productive in the long term. According to Vanherpe, the creation of a new right, even if limited in scope, would lead to additional, undesirable fragmentation of copyright law.[269] Rather, the proposed threshold of autonomy demands a change in judicial interpretation.

The proposed framework is one of "causation of originality", akin to the test used in criminal law, tort law or product liability.[270] This approach focuses on the creative choices that led to the production of the output. If the choices embedded in the machine's output may be attributed to the human programmer, trainer or user, and as long as this contribution is enough to merit copyright protection by fulfilling the related formalities, the AI work will be protected. Thus, if the creative choices embedded in the code or the user's instructions are directly reflected in the AI work, then the work ought to be protected. Where the creative choices may only be attributable to the machine by virtue of its autonomy, making choices which could not have been foreseen by a human, the work ought not to be protected. Whilst the work may be original, it is not the kind of originality copyright law should protect. Therefore, the works produced by a machine where the creative choices may not be traced back to a human are to be considered part of the public domain, that is, free of any exclusive right. Under s9(3)CDPA, the UK has shown a shift of focus towards the work itself, tracing back the process of creation to its origin, rather than on who created it. Regarding the US, the acceptance of

[265] Mezei (n12)12.
[266] Gervais (n46)8.
[267] Based on arguments that legislative actions are not desirable. *See* Axel Walz,'A Holistic Approach to Developing an Innovation-Friendly and Human-Centric AI Society'(2017) 48 ICC 757.
[268] Kop (n64)36.
[269] Vanherpe (n262)14.
[270] Gervais (n46)52.

forces beyond the control of the author,[271] as well as the shift of focus in *Meshworks v Toyota*[272] on the final output, rather than on the creative process giving rise to the digital wire-frame car models, may indicate a door slightly open to this focus on the work.

At first glance, the default position to treat AI-generated works that crossed the proposed autonomy threshold as part of the public domain may seem to hinder the economic incentives necessary to safeguard the copyright utilitarian aims, and would decrease any willingness to invest in innovation.[273] However, such incentives are inherent to the AI industry.[274] On the contrary, imposing the autonomy threshold encourages human-machine collaboration, instead of programming or training an independent and autonomous AI algorithm. Where this is the case, incentives for the creation of AI works are safeguarded through the copyright protection in the algorithm itself, or through its patentability and copyrightability.[275] Other tools include trade secrets, contracts or unfair competition, enabling one to protect the non-creative information.[276] This also encourages the creation of new knowledge,[277] as well as low cost access to highly socially valuable works.[278] This public domain alternative seeks to balance counterweight to copyright's over-expansion, with the important inspiration for human creativity.[279] Overall, the cultural and social development sought by copyright law by giving incentives for creation is therefore safeguarded, while acknowledging that machines do not need to be rewarded. Most importantly, considering a work (or part of it) as part of the public domain does not mean that the work is free to access.[280] This leaves room for incentives to disseminate the work, and perhaps, could be enhanced by an adequate "disseminator right".[281] One limitation of this is that a human may then add to the work and claim it as her own, especially given the difficulty of proving what the original content of a raw output was.[282] According to Samuelson, the outcome would be the same if granted to the user directly.[283] Nonetheless, a default rule based on assumptions is neither fair, nor desirable, and most importantly, would run counter to the aims of copyright law.

Where the work results from choices made by both the humans behind the machine and the AI system itself, only part of the work will be protected. Under the autonomy threshold, this means that any creative decisions which cannot be traced back to Cohen would render *AARON*'s paintings part of the public domain.

This solution perfectly suits the US' human-centric view on authorship.[284] However, this proposal may encounter some resistance in jurisdictions with a regime of CGWs like the UK, who may be reluctant to leave some works unprotected.[285] As the standard of originality moved further from skill,

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[271] *Bell* (n183)8.
[272] *Meshwerks v Toyota Motor Sales* 528F3d125 (2008).
[273] Ginsburg (n90)1068;Hristov (n5)438.
[274] Palace (n212)239-241.
[275] Samuelson (n49)1207.
[276] Perry and Margoni (n239)19.
[277] James Boyle,'The Second Enclosure Movement and the Construction of the Public Domain'(2003) 66 Law and Contemporary Problems 33,67.
[278] Séverine Dusollier,'Scoping Study on Copyright and Related Rights And The Public Domain'(WIPO 2011) CDIP/7/INF/2,12-13.
[279] Perry and Margoni (n239)25;Palace (n212)241.
[280] Dussolier (n278)7-9.
[281] Ramalho (n26)15.
[282] Samuelson (n49)1126-1127.
[283] *ibid.*
[284] Ricketson (n88)131.
[285] Ramalho (n26)20.

labour and effort of the author, perhaps the UK would instead choose to extend the regime of CGWs to cover the products of strong and sophisticated AI by reforming s9(3)CDPA, or through judicial interpretation of "person who makes the arrangements necessary".[286] This would ensure that firms keep investing in technology, while maintaining knowledge and have a return on their investment.[287] Abbott proposed changing the definition of CGWs to "works generated by a computer in circumstances such that the computer, if a natural person, would meet the authorship requirement".[288] Whilst this may be a sensible approach for AI-assisted works (assuming that more legal certainty is brought about by the legislature or the courts), it runs counter to justifications for the protection of AI-generated works, and removes any link between authorship and the creative process, by focusing on who made the creation possible, as opposed where the creativity is exhibited.[289] Moreover, it remains doubtful whether the UK, as impacted by the EU approach, is ready to definitively move away from the individual-centric approach anchored in modern copyright law. Alternatively, a system of open license or Copyleft which has proven to be suited to deal with software,[290] would enable one to distinguish between the different stakeholders' interests, leaving open the possibility for various actors to have a claim of authorship over the AI-generated work, with a view to create their own version of the AI algorithm.

4.2 How should the author be determined?

Where the autonomy threshold is not crossed, the question remains: who is the author? A default rule defining the investor, programmer, trainer or user as author is, in my opinion, undesirable. Instead, the afore-proposed causation of originality test is relied upon, tracing the creative choices back to their human origin. Though acknowledging that this rule causes substantial legal uncertainty, it would prevent the disruption of incentives and rewards, along with the deterrence of further technological innovation.

This solution is unproblematic in the UK, where there is no requirement of fixation for artistic works.[291] Reflecting on *The Next Rembrandt*, a joint authorship of the various stakeholders involved, who made creative choices at different levels of the creative process is desirable, and possible as a result of the rejection of a requirement of subjective intention by the courts.[292]

However, as mentioned in section 3.1, none of the stakeholders would meet the requirement of authorship alone in the US, where the requirement of intentional contributions precludes a joint authorship solution.[293] To resolve this, this paper suggests using Ginsburg and Budiardjo's test of "possible anticipation".[294] Where the creator of the creative plan (programmer or trainer) does not limit the user's creative autonomy and relies on her to endow the work with additional (unforeseen) creative content, she will lose her claim to sole authorship in the work.[295] Further, it is submitted that

[286] Guadamuz (n8)20.
[287] Guadamuz (n74).
[288] Abbott (n3)12–13.
[289] Samuelson (n49)1209.
[290] Brian Craver,'Share and Share Alike: Understanding and Enforcing Open Source and Free Software Licenses'(2005) 20 BerkeleyTechLJ 443.
[291] CDPA1988,s4(1).
[292] *Kogan v Martin* (n126)para53.
[293] *Thomson* (n235).
[294] Ginsburg and Budiardjo (n10)429-431.
[295] *ibid.*

the US belief that joint authorship fractionates rather than consolidates authorship rights[296] is outdated and ought to be reframed in light of the current realities.

Conclusion

In conclusion, this thesis submits that the current copyright law is ill-suited to achieve the technological and economic progress necessary to accommodate AI. Looking at copyright law's history and normative basis, its aim is evidently not to promote just creativity, but human creativity. Thus far, the concept of author has remained "constant in form and […] existence",[297] and it has only begun to face challenges in recent times. As it has adapted to entrepreneurial and collaborative works,[298] it is bound to eventually accommodate the challenges of AI. Foucault argued that inevitably, as our society changes, the author will disappear.[299]

However, we are not there yet. Today, most copyright regimes cannot and are not willing to separate themselves from this author-centric paradigm.[300] Granting copyright to machines creating artistic works may threaten much cherished human progress, compete unfairly with works produced by humans, and generate overwhelming and undesirable legal uncertainty.[301] Most importantly, it would run against the very core purpose of copyright law: granting copyright protection to expand knowledge by stimulating human effort and imagination through rewarding and incentivising the author.[302] Hence, rather than focusing on a framework for the copyright protection of AI-generated outputs, perhaps future research ought to focus on whether AI and the humans behind the machine may rely on any limitation or exception.[303] Whether we should repurpose copyright law altogether is another question, and beyond the remit of this paper. I will only briefly suggest that copyright law is not the right place to accommodate such technological change as it would change copyright into a purely economic tool for investment in innovation of non-creative content, akin to a patent. Such interests could fit better within other frameworks like unfair competition. The recommendations made in this essay are based on the contrasting examples of the artistic works *The Next Rembrandt*, and the paintings produced by *AARON*. Whether my conclusions are valid for other scenarios should be assessed in further research.

The UK system is more prepared and more willing than its US counterpart to face AI-related challenges. Whilst s9(3)CDPA seems only to (unsatisfactorily) address AI-assisted works, it still shows a willingness to acknowledge the protection of AI works and the contemporary technological reality. It is doubtful that the UK will go as far as to expand the provision to cover works with no direct connection with human originality, particularly given the judicial harmonisation of originality by the CJEU. However, it is possible that Brexit might cause a shift allowing the UK to acknowledge copyright protection of all AI works based on a broader and clearer s9(3). In contrast, the solutions offered by US scholars rely on an extension of existing legal fictions under the "work-made-for-hire" or "faithful agent" doctrines. However, such anthropomorphism of the legal fictions would turn the

[296] Samuelson (n49)1222.
[297] Michel Foucault,'What Is an Author?' in Paul Rabinow (ed), *The Foucault Reader* (Pantheon Books 1984),101–120.
[298] For discussion *See* Simone (n43).
[299] Michel Foucault (n297)119.
[300] Jane Ginsburg,'People Not Machines: Authorship and What It Means in the Berne Convention'(2018) 49 IIC 131,135.
[301] Palace (n212)234.
[302] Ginsburg (n92)7.
[303] Enrico Bonadio and Luke McDonagh,'Artificial Intelligence as Producer and Consumer of Copyright Works: Evaluating the Consequences of Algorithmic Creativity'(2020) 2 IPQ 112,126–131.

provisions on their heads, thereby ignoring the lack of human connection with the produced output, and running against the US' human-centric focus on the concept of authorship.

Applying the traditional authorship test does not offer a solution to the problem of AI authorship. However, excluding the possibility of protecting AI works altogether dangerously threatens to deter AI technological development. Hence, whilst the current disrupted law does not protect machine production, a shift in jurisdictional interpretation so to allow authorship of certain AI works is desirable, with limitations. I would suggest that it is beneficial to grant copyright protection to works produced by a machine, which retain some link to human originality, but that to strip copyright of this core requirement would transform it into a requirement of novelty recognised under patent law. Consequently, the proposal put forward is a threshold of autonomy in order to distinguish between those works with sufficient connection to a human behind the machine, and those which result from the autonomy and randomness built into the AI. This assessment would be made by looking for a causation of originality, tracing it back to where the creative choices were made. Where the autonomy threshold is crossed, the AI work would fall under the public domain. This allows the valuable work to be disseminated to the public, whilst continuing to reward and incentivise its creators through the protection of the AI itself.

This solution is temporary, yet necessary, given the rapid development of AI technologies. In the longer term, frameworks such as Japan's legislative proposal of introducing a separate framework for "non-human created IP", working in a similar way to trademarks,[304] relying on rules on unfair competition,[305] and granting protection to the programmer of highly popular and marketable algorithms,[306] might be desirable.

[304] Segawa Natsuko,'Japan Eyes Rights Protection for AI Artwork'(*Nikkei Asian Review*)<https://asia.nikkei.com/Politics-Economy/Economy/Japan-eyes-rights-protection-for-AI-artwork>accessed 9September 2020.
[305] *ibid.*
[306] Jani Ihalainen,'Computer Creativity: Artificial Intelligence and Copyright'(2018) 13 JIPLP 724,727-728.