

Redesigning Copyright Protection in the Era of Artificial Intelligence

*Haochen Sun**

ABSTRACT: How to protect the creations of artificial intelligence (“AI”) systems through copyright law is one of the most significant and complex legal issues of our time. Debated by stakeholders around the world, the issue has so far evaded consensus. However, a series of administrative and judicial rulings has altered the landscape. In 2019, a Chinese district court affirmed the copyrightability of a news article written by an AI-powered robot, clarifying that it was the AI developer that should be deemed copyright owner of the news article. In 2020, the United States Patent and Trademark Office, the European Patent Office, and the United Kingdom High Court prominently denied patent applications designating an AI system as an inventor.

This Article reveals the profound implications of these recent AI rulings for copyright protection of AI-generated works. It examines how these rulings shed new light on the nature and scope of authorship and ownership, two legal issues that are central to deciding whether and how AI-generated works merit copyright protection.

Drawing on its in-depth study of the recent AI rulings, the Article proposes a broad-based, forward-looking approach to protecting AI-generated works through a two-tiered legal mechanism. It suggests that legislators may consider awarding sui generis rights to AI works generated with human contributions, while those generated autonomously by AI systems without such contributions should be placed in the public domain without copyright protection.

* Associate Professor of Law, University of Hong Kong Faculty of Law. I benefitted greatly from presenting an earlier draft of this Article at the Digital Sovereignty Along the Digital Silk Road conference co-organized by Georgetown University Law Center and the University of Hong Kong Faculty of Law, and at the Redesigning Intellectual Property Protection in the Era of Artificial Intelligence conference organized by Law and Technology Center at University of Hong Kong. I am grateful to Ryan Abbott, Hillary Brill, Dan Burk, Anupam Chander, Carys Craig, Jeanne Fromer, Daniel Gervais, Mark Lemley, Mark McKenna, Ruth Okediji, Pamela Samuelson, Anna Wu, and Winnie Yeung for their helpful conversations and comments. The Article discusses the laws and cases that had been made available by June 2021.

I. INTRODUCTION.....	1214
II. THE RECENT LANDMARK AI RULINGS.....	1217
A. CHINA	1218
B. EUROPEAN UNION	1220
1. Äquivalenter Aortendruck.....	1220
2. DABUS	1221
C. UNITED STATES.....	1223
III. APPLYING THE RECENT AI RULINGS TO COPYRIGHT LAW.....	1225
A. DEBATES ABOUT COPYRIGHT PROTECTION OF AI-GENERATED CREATIONS.....	1225
1. Authorship.....	1226
i. Against AI Authorship.....	1226
ii. In Favor of AI Authorship.....	1229
2. Ownership.....	1232
B. LESSONS FROM THE RECENT AI RULINGS.....	1233
IV. CREATING A TWO-TIERED MECHANISM FOR PROTECTING AI CREATIONS.....	1235
A. “SUI GENERIS” RIGHTS.....	1236
1. Sui Generis Protection of IP Rights	1236
2. Sui Generis Right for AI Creations with Human Contributions	1238
3. Modelling Sui Generis Protection After Mask Works	1242
i. Sui Generis Protection of Mask Works	1242
ii. Creating a New Sui Generis Right.....	1244
B. PLACING AUTONOMOUS AI CREATIONS IN THE PUBLIC DOMAIN.....	1248
1. Autonomous AI Technologies	1248
2. The Case for the Public Domain.....	1249
V. CONCLUSION	1251

I. INTRODUCTION

National governments and scholars have debated about the legal status of works generated by artificial intelligence (“AI”). Nevertheless, there still exists fundamental disagreement on this issue in the United States and abroad. For instance, policymakers and scholars sharply disagree on whether AI systems can be recognized and protected by copyright law as authors of the works they create. While many believe that the traditional human-centric

notion of authorship necessarily excludes AI,¹ others contend that this notion has become obsolete in the age of AI and call for a more dynamic interpretation of authorship.²

Amid this lack of consensus and the complexity and rapidly evolving nature of AI, exploration of how intellectual property (“IP”) systems should protect AI-generated creations remains in its early stages. The World Intellectual Property Organization, for example, acknowledges that it is still “developing *preliminary* considerations to questions raised for IP policy by AI”³ In 2019, the U.S. Patent and Trademark Office (“USPTO”) called for submissions on AI and IP policy, summarizing nearly 200 comments from various stakeholders (but not presenting its own position) in the report *Public Views on Artificial Intelligence and Intellectual Property Policy*.⁴ Other national IP offices have made similar efforts to advance understanding of AI and IP policy.⁵

The years of 2019 and 2020, however, were a watershed, with seminal rulings made on several fronts. In Europe, the European Patent Office (“EPO”) and UK Intellectual Property Office (“UKIPO”) issued rulings on DABUS and another AI patent application, clarifying inventorship and

1. See, e.g., U.S. COPYRIGHT OFFICE, COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICES §§ 306, 313.2 (3d ed. 2017) (announcing that “the Office will refuse to register a claim if it determines that a human being did not create the work” and “the Office will not register works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author”); Jane C. Ginsburg & Luke Ali Budiardjo, *Authors and Machines*, 34 BERKELEY TECH. L.J. 343, 408 (2019); Daniel J. Gervais, *The Machine as Author*, 105 IOWA L. REV. 2053, 2072 (2020) (demonstrating “that the roots of copyright law were planted in a soil which requires humanness of authorship for a work to be protected”); Carys Craig & Ian Kerr, *The Death of the AI Author*, 52 OTTAWA L. REV. 31, 67 (2021) (“It is important to remember . . . that even if a machine predicts all the right words . . . it neither knows, understands, nor appreciates the connotation of its word assemblage, let alone the meaning or value of the ‘work’ as a whole.”).

2. See, e.g., Annemarie Bridy, *Coding Creativity: Copyright and the Artificially Intelligent Author*, 2012 STAN. TECH. L. REV., 1, 24–27; Bruce E. Boyden, *Emergent Works*, 39 COLUM. J.L. & ARTS 377, 378–79 (2016); Margot E. Kaminski, *Authorship, Disrupted: AI Authors in Copyright and First Amendment Law*, 51 U.C. DAVIS L. REV. 589, 592 (2017).

3. *Artificial Intelligence and Intellectual Property Policy*, WORLD INTELL. PROP. ORG. (emphasis added), https://www.wipo.int/about-ip/en/artificial_intelligence/policy.html [<https://perma.cc/2Z5A-M5VE>].

4. U.S. PAT. & TRADEMARK OFF., PUBLIC VIEWS ON ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY POLICY (2020), <https://www.ml4patents.com/blog-posts/public-views-on-ai-and-ip-policy-from-uspto> [<https://perma.cc/4WYV-73UH>] (“Building on the momentum of those discussions, on August 27, 2019, the USPTO issued a request for comments (RFC) on patenting AI inventions. The RFC sought feedback from our stakeholders on a variety of patent policy issues, such as AI’s impact on inventorship and ownership, eligibility, disclosure, and the level of ordinary skill in the art.”).

5. *Artificial Intelligence and Intellectual Property: Call for Views*, INTELL. PROP. OFF., GOV. UK (Nov. 2, 2020), <https://www.gov.uk/government/news/artificial-intelligence-and-intellectual-property-call-for-views> [<https://perma.cc/6XRE-PFGV>] (“On 7 September 2020, the IPO launched a Call for Views on AI and IP posing a series of important questions. These include questions relating to AI and patents, trade marks, designs, trade secrets and copyright.”).

patentability standards for AI-generated inventions and ruling that AI systems, such as DABUS, should not be protected as inventors.⁶ The UK High Court upheld the UKIPO's ruling,⁷ and the USPTO rejected the DABUS patent application on the same legal grounds.⁸ Chinese courts also handed down landmark rulings on IP protection of AI-generated creations. For instance, a Chinese district court affirmed the copyrightability of a news article written by Dreamwriter,⁹ an AI-powered robot capable of generating about 300,000 news articles per year.¹⁰

This Article conducts an in-depth study of what it refers to collectively as the “recent AI rulings.” It focuses on how these rulings shed light on the nature and scope of authorship and copyright ownership, core legal standards in dire need of authoritative clarification. The Article examines how the DABUS rulings of the EPO, the UK High Court, and the USPTO deal with the relationship between AI and inventorship and how they explain why AI systems should not be treated as inventors.¹¹ It also considers how the Chinese court's *Dreamwriter* ruling tackles the relationship between AI and authorship and provides a legal basis for protecting AI-generated works.¹² On the basis of these examinations, the Article considers the extent to which the recent AI rulings can offer lessons for courts dealing with similar cases and reframe the on going policy and legal debate on copyright protection of AI-generated works.¹³

6. See *infra* Section II.B; Imogen Ireland & Jason Lohr, *DABUS: The AI Topic That Patent Lawyers Should Be Monitoring*, MANAGING IP (Sept. 9, 2020), <https://www.managingip.com/article/b1n8q624s4yv4/dabus-the-ai-topic-that-patent-lawyers-should-be-monitoring> [<https://perma.cc/F33Z-E8Ng>] (“In its DABUS decisions, the EPO considered that the interpretation of the legal framework of the EPC led to the conclusion that the inventor designated in a European patent had to be a natural person (and not any other entity).”).

7. See *infra* Section II.B; James Nurton, *UK Judge Upholds Refusal of DABUS Patents*, IPWATCHDOG (Sept. 24, 2020), <https://www.ipwatchdog.com/2020/09/24/uk-judge-upholds-refusal-dabus-patents/id=125584> [<https://perma.cc/ARD6-TDM8>].

8. See *infra* Section II.C; *AI Cannot Be Recognised as an Inventor, US Rules*, BBC NEWS (Apr. 29, 2020), <https://www.bbc.com/news/technology-52474250> [<https://perma.cc/UN5A-JPXX>].

9. See *infra* Section II.A; Sylvia Polydor, Martyna Czapska & Karen Roberts, *Chinese Dreamwriter Decision: A Dream Come True for AI-Generated Works?*, BAKER MCKENZIE: CONNECT ON TECH (Apr. 20, 2020), <https://www.connectontech.com/chinese-dreamwriter-decision-a-dream-come-true-for-ai-generated-works> [<https://perma.cc/L5QT-9XPD>] (“[I]t is the first time the human element of an AI created work was considered sufficient and copyright protection was granted.”).

10. Consortia, “*Tencent Dreamwriter*”: *Decision of the People's Court of Danshan (District of Shenzhen) 24 December 2019—Case No. (2019) Yue 0305 Min Chu No. 14010*, 51 INT'L REV. INTELL. PROP. & COMPETITION L. 652, 653 (2020) (“Since 2015, the plaintiff's creative staff have used Dreamwriter in the completion of about 300,000 works each year.”); see also Pony Ma, *Opinion, What China's Internet Has Become*, WASH. POST (Nov. 26, 2018), <https://www.washingtonpost.com/news/the-worldpost/wp/2018/11/26/tencent> [<https://perma.cc/V76M-MPJA>] (“Every day, Tencent's Dreamwriter, a news-writing robot, wrote and released 2,000 finance or sports-related news articles.”).

11. See *infra* Section II.B–C.

12. See *infra* Section II.A.

13. See *infra* Part III.

This Article also proposes a broad-based, forward-looking approach to the international protection of AI-generated creations through a two-tiered legal mechanism. According to this mechanism, AI works generated with human contributions should be awarded *sui generis* rights designed specifically to protect this type of IP.¹⁴ However, AI works generated solely by autonomous AI systems should be placed in the public domain without copyright protection.¹⁵

Compared with existing policy and legal recommendations, this proposal has two novel advantages. First, it advocates for a differentiation between two types of AI-generated creations, namely those infused with human contributions and those without, and then suggests different ways of protecting them. Most policymakers and scholars have not made this distinction, and their proposals about IP policy have targeted AI creations of the same nature.¹⁶ In contrast, this Article argues that a nuanced understanding of the nature of AI creations is much needed. Second, this proposal better encourages the application of more advanced AI to the creation of works, and protects the public interest in accessing and using them. For example, the proposed *sui generis* mechanism protects AI-generated works with human contributions for *ten* years; significantly less than the existing copyright protection term of author's life plus 70 years. In this way, the *sui generis* system would protect authors' interests while also promoting public access to and use of these works.

The remainder of this Article proceeds as follows. Part II examines the background and legal bases of the recent AI rulings. Part III discusses the major disagreements characterizing the debate on IP protection of AI-generated creations. It then considers the extent to which the recent AI rulings offer useful lessons for judges deciding similar cases, and how the rulings can reshape policy and legal arguments in the academic discourse on copyright protection of AI-generated creations. Part IV puts forward a two-tiered mechanism that confers *sui generis* IP rights on AI creations generated with human contributions and places creations solely generated by autonomous AI systems in the public domain.

II. THE RECENT LANDMARK AI RULINGS

In this Part, I examine the major administrative and judicial AI rulings decided in 2019 and 2020. With a brief introduction of each AI system

14. See *infra* Section IV.A.

15. See *infra* Section IV.B.

16. See, e.g., Tim W. Dornis, *Artificial Intelligence and Innovation: The End of Patent Law as We Know It*, 23 YALE J.L. & TECH. 97, 133 (2020) ("After all, once this specific application or selection of applications has been determined to reflect the 'average' AI skill level, by definition, all inventive output would have to be considered obvious." (emphasis omitted) (footnote omitted)); Benjamin L. W. Sobel, *Artificial Intelligence's Fair Use Crisis*, 41 COLUM. J.L. & ARTS 45, 47 (2017) ("The fast-growing body of legal scholarship on AI and copyright tends to focus on one question: what happens when computers produce outputs that resemble conventional, expressive works of art by human creators, such as musical compositions, images, poetry, and prose—do these 'works' have 'authors?'" (footnote omitted)).

involved, I discuss how these rulings determine whether they could be recognized and protected as inventors or authors under the IP protection systems in China, the European Union, and the United States.

A. CHINA

In December 2019, the Shenzhen Nanshan District People's Court ruled that an article by Tencent's Dreamwriter AI system should be protected by copyright.¹⁷ Dreamwriter is a set of data and algorithm-based intelligent writing assistance systems developed by Tencent.¹⁸ "On August 20, 2018, . . . Tencent first published a financial reporting article," written by Dreamwriter, "on the Tencent Securities website."¹⁹ Shanghai Yingxun Technology Company republished the article on its own website on the same day without Tencent's permission, which prompted Tencent to sue Yingxun for copyright infringement in Shenzhen Nanshan District People's Court.²⁰

Article 2 of the Regulation for the Implementation of the Copyright Law ("Implementation Regulation") refers to a copyrightable work as an intellectual achievement that is original and "can be reproduced in a tangible form" in the literary, artistic, and scientific fields.²¹ Since the Tencent article belonged to the literary field and was reproducible, it remained for the court to determine originality by a two-step test.²²

First, the court determined whether the news article had had a minimal degree of creativity.²³ It found that it met the formal requirements of a literary work, and that its content reflected the selection, analysis, and judgment of

17. See Bo Zhou, *Artificial Intelligence and Copyright Protection—Judicial Practice in Chinese Courts*, at 2 [hereinafter *Dreamwriter* ruling], https://www.wipo.int/export/sites/www/aboutip/en/artificial_intelligence/conversation_ip_ai/pdf/ms_china_1_en.pdf [https://perma.cc/M2TM-N4WQ] (citing Shenzhen Tencent Comput. Sys. Co. v. Shanghai Yingmou Tech. Co., People's Court of Nanshan District, 2019 Guangdong 0305 Minchu No. 14010. (Nov. 24, 2019)); *Chinese Court Backs Copyrights for AI-Created Works*, CHINA JUST. OBSERVER (Oct. 30, 2020), <https://www.chinajusticeobserver.com/a/chinese-court-backs-copyrights-for-ai-created-works> [https://perma.cc/ZHD5-SA2S]; Polydor, Czapska & Roberts, *supra* note 9.

18. See Hui Feng He, *End of the Road for Journalists? Tencent's Robot Reporter 'Dreamwriter' Churns Out Perfect 1,000-Word News Story—In 60 Seconds*, S. CHINA MORNING POST (Sept. 11, 2015, 8:00 AM), <https://www.scmp.com/tech/china-tech/article/1857196/end-road-journalists-tencents-robot-reporter-dreamwriter-churns-out> [https://perma.cc/Q6ML-CA2H].

19. See *Dreamwriter* ruling, *supra* note 17, at 1.

20. *Id.*

21. Decision of the State Council on Amending the Regulations for the Implementation of the Copyright Law of the People's Republic of China (promulgated by Decree No. 359 of the State Council of China, Aug. 2, 2002, amendment promulgated by Decree No. 633 of the State Council of China, Jan. 30, 2013, effective Mar. 1, 2013), art. 2, <https://wipolex-res.wipo.int/edocs/lexdocs/laws/en/cn/cn213en.pdf> [https://perma.cc/4SLL-EG9A].

22. *Dreamwriter* ruling, *supra* note 17, at 2–4.

23. *Id.* at 1–2.

the relevant stock market information and data on the relevant day.²⁴ Moreover, the article had a reasonable and expressive structure and a clear logic.²⁵

Second, the court found that the generation process of the new article reflected the Tencent team's personalized choice, judgment, and skills.²⁶ The plaintiff's main creating team generated the article through four stages: (1) data service; (2) triggering and writing; (3) smart verification; and (4) smart distribution.²⁷ Throughout these stages, "the input of data types[,] the processing of data formats, the setting of trigger conditions, the selection of article frame templates[,] the setting of the corpus, and the training of intelligent verification algorithm models"²⁸ were all carried out by the Tencent creating team and then followed by a two-minute generation process using Dreamwriter.²⁹

According to Article 3 of the Implementation Regulation, the Copyright Law refers to intellectual activities that directly produce literary, artistic, and scientific works.³⁰ Pursuant to this article, whether the act is an intellectual activity and whether there is a direct connection between the act and the specific form of expression of the work should be taken into account when determining whether the Copyright Law applies.³¹ The arrangement and selection undertaken by Tencent creating team throughout the four stages "were intellectual activities . . . directly related to the specific expression of the article."³² If just the news article's two-minute automatic generation period were deemed the creation process, no human participation would then be involved because during this time "the computer software run[s] the established rules, algorithms, and templates" to produce the article.³³

However, as the court found, the automatic operation of Dreamwriter was determined by Tencent creating team.³⁴ It would be unfair to regard such automatic operation as the entire creation process completed by Dreamwriter alone.³⁵

24. CHINA JUST. OBSERVER, *supra* note 17.

25. *Id.*

26. *Id.*; *Dreamwriter* ruling, *supra* note 17, at 2–4

27. CHINA JUST. OBSERVER, *supra* note 17.

28. *Id.*

29. *Id.*

30. *Id.*

31. *Id.*

32. *Id.*

33. *Id.*

34. *Id.*

35. *Id.*

B. EUROPEAN UNION

In 2020, the EPO made two landmark decisions on inventions involving AI that considered both patentability requirements and whether AI systems can be legally considered inventors.

1. Äquivalenter Aortendruck

In the first case, the EPO denied a patent for an invention employing an artificial neural network to determine cardiac output.³⁶ An artificial neural network is a system of AI modeled on the architecture of the human brain.³⁷ Just as the human brain is a complex network comprising billions of interconnected neurons, “artificial neural networks consist of groups of interconnected layers of algorithms that feed data into each other and that can be trained to complete tasks by altering the relevance of data as they pass between layers.”³⁸ During training, the system applies different weights to each input variable until it has developed the ability to complete its intended task. The claimed invention was the mathematical transformation of a “blood pressure curve measured at the periphery . . . into the equivalent aortic pressure with the help of an artificial neural network, the weighting values of which are determined by learning.”³⁹

The EPO refused the patent application on two grounds. First, it ruled that the invention did not meet the disclosure requirement under Article 83 of the European Patent Convention (“EPC”).⁴⁰ Article 83 mandates that an application must release “sufficiently clear and complete” information about the invention so that a person skilled in the art can apply it in practice.⁴¹ As artificial neural networks are composed of layers upon layers of interconnected variables, it is “virtually impossible to trace how their millions . . . of parameters combine to” produce an output, and even when programmers “have access to those parameters,” the output cannot be deconstructed with precision.⁴² In this case, though the application noted that the training data should cover a broad spectrum of patients of different ages, genders, and health conditions, it did not specify any characteristics of the input data suitable for training the AI dataset, or at least a data record suitable

36. *In re* ARC Seibersdorf Rsch. GmbH, T 0161/18, EPO Bds. of App., ¶ I (May 12, 2020) [hereinafter *Äquivalenter Aortendruck*], <https://www.epo.org/law-practice/case-law-appeals/recent/t180161du1.html> [<https://perma.cc/626P-7FYU>].

37. RYAN ABBOTT, *THE REASONABLE ROBOT: ARTIFICIAL INTELLIGENCE AND THE LAW* 30 (2020).

38. *Id.*; see *Äquivalenter Aortendruck*, *supra* note 36, ¶ V.

39. *Äquivalenter Aortendruck*, *supra* note 36, ¶ V.

40. *Id.* ¶ III.

41. Convention on the Grant of European Patents, art. 83, Oct. 5, 1973, 1065 U.N.T.S. 199 [hereinafter EPC].

42. Ben Dickson, *The Dangers of Trusting Black-Box Machine Learning*, TECHTALKS (July 27, 2020), <https://bdtechtalks.com/2020/07/27/black-box-ai-models> [<https://perma.cc/5E7N-8Z6J>].

for solving the underlying technical problem.⁴³ Since the results could not be reproduced by a person skilled in the art, the invention was insufficiently disclosed.⁴⁴ Given the black box nature of a neural network or similar machine learning process employed to generate a result or entire invention, it is not possible for a patent applicant to illustrate precisely how their system arrived at a result.⁴⁵ This ruling, therefore, makes it difficult to meet European patent law disclosure requirements for any invention using such a system.

The EPO also ruled that the application did not involve an “inventive step” as required by Article 56 of the EPC.⁴⁶ The applicant contended that “the neural network [w]as the inventive feature . . . [as] the closest prior art . . . disclose[d] a method for applying a transformation to a blood pressure curve but did not disclose not a neural network capable of applying this transformation.”⁴⁷ The neural network was also inventive in that “it achieved a technical effect of guaranteeing a precise output at modest computational cost.”⁴⁸ The EPO rejected this argument on the ground that the application failed to provide details about the training of the neural network.⁴⁹ In the case of machine learning, the basis of the inventive step is the ability to drive a machine to achieve certain ends.⁵⁰ Mentioning in general terms that the output data are determined by learning does not go beyond the normal understanding of reasonable people skilled in the art, so the neural network insofar as what is disclosed cannot be used to achieve any technical effect.⁵¹

2. DABUS

In the second case, the EPO decided that an AI system could not be listed as an inventor on a patent application.⁵² The applicant, Dr. Stephen Thaler, “is in the business of developing and applying advanced [AI] systems that are

43. *Äquivalenter Aortendruck*, *supra* note 36, ¶ 2.2.

44. *Id.*

45. *See infra* notes 201–03 and accompanying text.

46. *Äquivalenter Aortendruck*, *supra* note 36, ¶ 3.8; Patrick Heckeler, *Training of an Artificial Neural Network: Insufficiently Disclosed*, BARDEHLE PAGENBERG (Dec. 13, 2020), <https://www.bardehle.com/europeansoftwarepatents/knowledge-base/training-of-an-artificial-neural-network> [https://perma.cc/42M9-EVR4].

47. Ian Jones & Sam Jones, *AI and Sufficiency—How Much Should Be Disclosed?*, GJE: INTELL. PROP. (Nov. 23, 2020), <https://www.gje.com/ai-and-sufficiency-how-much-should-be-disclosed> [https://perma.cc/MJ59-A22F].

48. *Id.*

49. *Id.*

50. *Id.*

51. Matthieu Dhenne, *T 161/18: Sufficiency of Disclosure Put to the Test of Artificial Intelligence*, INST. STANISLAS DE BOUFFLERS: @DE BOUFFLERS BLOG (June 28, 2020), <https://www.institutboufflers.org/en/t-161-18-sufficiency-of-disclosure-put-to-the-test-of-artificial-intelligence-matthieu-dhenne> [https://perma.cc/ZF2W-ZT9P].

52. *EPO Refuses DABUS Patent Applications Designating a Machine Inventor*, EUROPEAN PAT. OFF. (Dec. 20, 2019), <https://www.epo.org/news-events/news/2019/20191220.html> [https://perma.cc/Z5QN-6XKH].

capable of generating patentable output” without involving any natural person.⁵³ In 2018 and 2019, he filed parallel applications at the EPO and UKIPO, listing the AI system DABUS as the inventor, which had supposedly “identified the novelty of its own idea before a natural person did.”⁵⁴ DABUS employs a set of artificial neural networks to generate new ideas and a subsequent set of neural networks to analyze them and determine whether they are “novel or useful.”⁵⁵ The patent applications listing DABUS as the inventor were for a beverage container based on fractal geometry, which improved safety during shipping, and an emergency beacon, which “flicker[ed] in a pattern mimicking neural activity to [better] attract attention.”⁵⁶

The EPO rejected the application on the grounds of failure to comply with Article 81 of the EPC and Rule 19(1) of its Implementing Regulations, which require the designation of an inventor.⁵⁷ Since Rule 19(1) requires the designation to state the family name, given names, and full address of the inventor, the EPO concluded that the legal framework of the EPC requires inventors to be natural or legal persons and thus rejected the designation of DABUS as inventor.⁵⁸ According to the EPO, “[n]ames given to natural persons, whether composed of a given name and a family name or mononymous, serve not only the function of identifying them but enable them to exercise their rights and form part of their personality.”⁵⁹ Having no legal personality, machines cannot enjoy rights vested in inventors under Article 62 of the EPC, including the right to be named on patent applications.⁶⁰ For the same reason, DABUS could not be regarded as an employee of Dr. Thaler either.⁶¹ The EPO further reasoned that the legislative history of the EPC shows that legislators were in agreement that only natural persons could be listed as inventors, noting, for instance, that discussion as to

53. Complaint for Declaratory and Injunctive Relief at 1, *Thaler v. Iancu*, 2021 WL 659486 (E.D. Va. Jan. 18, 2021) (No. 1:20-cv-00903).

54. Ireland & Lohr, *supra* note 6.

55. *Can Artificial Intelligence Systems Patent Their Inventions?*, DENNEMEYER – THE IP GROUP, LEXOLOGY (Nov. 22, 2019), <https://www.lexology.com/library/detail.aspx?g=5b476088-81fc-4bc4-bd84-4c4doeb69407> [<https://perma.cc/KUK2-FGU9>].

56. *Id.*

57. Wensen An, *The Lay of the Land: Patent Law and AI Inventors*, ROBOTICS L.J. (Oct. 30, 2020), <https://www.roboticslawjournal.com/analysis/the-lay-of-the-land-patent-law-and-ai-inventors-33535461> [<https://perma.cc/Z3NW-L2FX>].

58. European Patent Office decision of 27 January 2020 on EP 18 275 163.6, at ¶¶ 21–23.

59. *Id.* ¶ 22 (footnote omitted).

60. *Id.* ¶ 27.

61. Joel Smith, Rachel Montagnon & Laura Adde, *EPO Publishes Reasons for Rejecting AI as Inventor on Patent Application*, HERBERT SMITH FREEHILLS (Feb. 4, 2020), <https://hsfnotes.com/ip/2020/02/04/epo-publishes-reasons-for-rejecting-ai-as-inventor-on-patent-application> [<https://perma.cc/N7XZ-LBU3>].

whether legal persons could be named as inventors did ultimately result in a corresponding rule.⁶²

The designation was similarly rejected in the UK. The UKIPO found that section 13(2)(a) of the UK Patents Act requires the applicant to identify the “person or persons” who is believed to be the inventor and concluded that this shows the EPC does not extend beyond human inventors.⁶³ According to the UKIPO, even if the AI machine could be regarded as the inventor, the applicant would have difficulty obtaining ownership of the invention because the machine is incapable of owning or transferring any rights.⁶⁴ The UKIPO concluded that “[t]here has never been any indication from the courts that this is an incorrect interpretation and it is settled law that an inventor cannot be a corporate body.”⁶⁵ The UKIPO then noted that “the applicant acknowledges that DABUS is an AI machine and not a human, so cannot be taken to be a ‘person’ as required by the Act.”⁶⁶ In September 2020, the UK High Court agreed with the UKIPO’s decision and rejected DABUS patent applications.⁶⁷

C. UNITED STATES

Dr. Thaler also filed patent applications on the two DABUS inventions at the USPTO in 2019, again naming DABUS as the inventor.⁶⁸ The USPTO denied both applications on the basis that the applications failed to disclose a natural person as the inventor and identified three key considerations.⁶⁹

First, the USPTO decided that the statutory language mandates inventors to be individuals.⁷⁰ It based this opinion on various statutory references. Pursuant to 35 U.S.C. § 100(a), an “inventor” is the individual or, collectively, “the individuals . . . who invented . . . the subject matter of the [patent application].”⁷¹ According to the USPTO, the word “whoever” in section 101,

62. *Id.*

63. BL O/741/19, Decision, U.K. Intellectual Property Office, ¶¶ 14–18 (Dec. 4, 2019) [hereinafter BL O/741/19], <https://www.ipo.gov.uk/p-challenge-decision-results/074119.pdf> [<https://perma.cc/DUW6-2745>].

64. *See id.* ¶ 21; An, *supra* note 57.

65. BL O/741/19, *supra* note 63, ¶ 18.

66. *Id.*

67. *See* Thaler v. Comptroller-Gen. of Pats., Designs & Trade Marks, CH-2019-000339, [2020] EWHC 2412 (Pat), Appeal, Business and Property Courts of England and Wales, Patents Court, ¶ 51 (Sept. 21, 2020), <https://www.bailii.org/ew/cases/EWHC/Patents/2020/2412.html> [<https://perma.cc/L37E-WFJM>]; Ioanna Antcheva, *AI and the Fight for Inventorship—DABUS Patent Knocked Out in UK High Court*, LENS (Oct. 15, 2020), <https://thelens.slaughterandmay.com/post/102ghwe/ai-and-the-fight-for-inventorship-dabus-patent-knocked-out-in-uk-high-court> [<https://perma.cc/K7LQ-Z4DB>].

68. *In re* Application of Application No.: 16/524,350, 2020 WL 1970052, at *1 (Dec. Comm’r Pat. Apr. 22, 2020).

69. *Id.* at *3–4.

70. *Id.* at *4.

71. *Id.* at *3.

stating that “[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter . . . may obtain a patent,” suggests a requirement that the inventor be a natural person.⁷² Similarly, in reference to the person who claims to be the original inventor of the invention in an application, section 115(b) “refers to [an] individual[] and uses pronouns specific to natural persons,” such as “himself” and “herself.”⁷³ In section 115(a), it is provided that a patent application shall include the name of the inventor for the claimed invention, and section 115(h)(1) “further states that the inventor who executes an oath or declaration must be a ‘person.’”⁷⁴ Other Title 35 sections refer to individuals when mentioning inventors.⁷⁵ For example, section 102(a), which relates to the novelty condition of a patent application, states that “[a] person shall be entitled to a patent . . .”⁷⁶ Where the wrong inventor is named in the patent application, section 116(c) only applies when it is a “person” that has been incorrectly named.⁷⁷ Given this consistent reference to persons and individuals, “interpreting ‘inventor’ broadly to encompass machines would contradict [a] plain reading of the patent statute[] . . .”⁷⁸

Second, responding to the analogies between AI systems and corporations or sovereigns, the USPTO ruled that neither of them can be inventors on the basis of existing case law.⁷⁹ In *Univ. of Utah v. Max-Planck-Gesellschaft zur Forderung der Wissenschaften e.V.*, the U.S. Federal Circuit Court of Appeals explained that the sovereign cannot be an inventor.⁸⁰ Similarly, in *Beech Aircraft Corp. v. EDO Corp.*, the Federal Circuit stated that corporations cannot be inventors since “only natural persons can be ‘inventors.’”⁸¹ Neither a state, corporation, nor machine can meet the requirement of conception, defined in *Townsend v. Smith* as “the complete performance of the mental part of the inventive art.”⁸²

Third, the USPTO further pointed out that the act of inventorship requires conception, and this is a process that machines cannot perform.⁸³ The crux of conception is the inventor’s “formation . . . of a definite and permanent idea of the . . . invention,” which is subsequently translated into

72. *Id.*

73. *Id.*

74. *Id.* (footnote omitted).

75. *Id.*

76. *Id.* at *3 n.12.

77. *Id.*

78. *Id.* at *3.

79. *Id.* at *4.

80. *Univ. of Utah v. Max-Planck-Gesellschaft Zur Forderung Der Wissenschaften e.V.*, 734 F.3d 1315, 1323 (Fed. Cir. 2013).

81. *Beech Aircraft Corp. v. EDO Corp.*, 990 F.2d 1237, 1248 (Fed. Cir. 1993).

82. *Townsend v. Smith*, 36 F.2d 292, 295 (C.C.P.A. 1929).

83. *In re Application of Application*, 2020 WL 1970052, at *4.

practice.⁸⁴ The mental nature of this foundation of invention distinguishes conception from other elements of patentability.⁸⁵ Therefore, conception of an invention must be performed by a natural person rather than machines.⁸⁶

The USPTO held that the applications did not comply with 35 U.S.C. § 115(a) for the above three reasons and thereby rejected Dr. Thaler's patent applications that named DABUS as the inventor. In August 2020, Dr. Thaler filed a lawsuit against the USPTO in the U.S. District Court for the Eastern District of Virginia.⁸⁷ At the time of drafting this Article, the court had yet to hand down its decision.

III. APPLYING THE RECENT AI RULINGS TO COPYRIGHT LAW

In this Part, I examine implications of the recent AI rulings on copyright protection of AI-generated works. I first review the ongoing debates about authorship and copyright ownership, core legal issues that inform whether existing copyright law should protect AI-generated creations.⁸⁸ I then consider the extent to which the recent AI rulings can restructure these debates, identify relevant lessons from the rulings, and offer important insights for IP administrators and judges making decisions in AI cases.

A. DEBATES ABOUT COPYRIGHT PROTECTION OF AI-GENERATED CREATIONS

Can AI systems be recognized as authors and owners of the works they generate? Authorship and ownership are the most controversial and complex issues in AI-related copyright law. Amid raging policy and academic debate, no consensus on these issues has emerged.

84. *Burroughs Wellcome Co. v. Barr Lab's, Inc.*, 40 F.3d 1223, 1227–28 (Fed. Cir. 1994) (citation omitted).

85. *See id.* at 1228.

86. *See id.*

87. Erin Hanson & Nashel Jung, *USPTO Publishes Report on Public Views on Artificial Intelligence and IP Policy—US IP Law Adequate for Now, Until Artificial General Intelligence is Reached?*, WHITE & CASE (Oct. 22, 2020), <https://www.whitecase.com/publications/alert/uspto-publishes-report-public-views-artificial-intelligence-and-ip-policy-us-ip> [<https://perma.cc/EPB6-2QBS>]; *see* Complaint for Declaratory and Injunctive Relief at 1–2, *Thaler v. Iancu*, 2021 WL 659486 (E.D. Va. Jan. 18, 2021) (No. 1:20-cv-00903); Kate Gaudry, Rodney Rothwell, Aarti Shah, & Dario Machleidt, *Should We Require Human Inventorship? Submit Your Amicus Brief by March*, IPWATCHDOG (Feb. 11, 2021), <https://www.ipwatchdog.com/2021/02/11/require-human-inventorship-submit-amicus-brief-march/id=129922> [<https://perma.cc/U287-GQU2>] (“The Applicant has appealed these rejections to the Eastern District of Virginia (E.D. Va.) . . . The hearing date for the U.S. DABUS case is set for March 29, 2021.”).

88. *See* WORLD INTELL. PROP. ORG., REVISED ISSUES PAPER ON INTELLECTUAL PROPERTY POLICY AND ARTIFICIAL INTELLIGENCE 4–12 (2020), https://www.wipo.int/edocs/mdocs/mdocs/en/wipo_ip_ai_2_ge_20/wipo_ip_ai_2_ge_20_1_rev.pdf [<https://perma.cc/T3AE-ZSDJ>].

1. Authorship

i. Against AI Authorship

Scholars have argued that the human-centric notion of authorship excludes AI-created works from copyright law protection.⁸⁹ Since copyright is designed to protect human creativity, the argument goes, copyright laws entitle only human beings to own copyrights in virtually all jurisdictions.⁹⁰

This human-centric notion of authorship is deeply rooted in the major theories of copyright law. According to the personality theory, copyrighted works are manifestations of the author's personality and will.⁹¹ Authorship, then, is a distinctly human process of self-actualization and expression,⁹² a social practice inseparable from "humanness" and human communication.⁹³ The labor theory, meanwhile, suggests that mixing only human labor with an object gives rise to ownership of the object by that human.⁹⁴ Informed by this theory, judicial rulings have long upheld the proposition "that an author should reap the pecuniary profits of his own ingenuity and labour."⁹⁵

International copyright law embraces the human-centric notion of authorship. For instance, the Berne Convention for the Protection of Literary and Artistic Works⁹⁶ expressly requires that an author be a human being.⁹⁷ It states that "the author shall enjoy the exclusive right of making a collection of

89. See James Grimmelman, *There's No Such Thing as a Computer-Authored Work—And It's a Good Thing, Too*, 39 COLUM. J.L. & ARTS 403, 403 (2016) ("[C]omputer-authored works . . . don't exist. Copyright law doesn't recognize computer programs as authors, and it shouldn't." (footnote omitted)); Tim W. Dornis, *Artificial Creativity: Emergent Works and the Void in Current Copyright Doctrine*, 22 YALE J.L. & TECH. 1, 20 (2020) ("U.S. copyright . . . is still based on the concept of a natural person being the author or creator and, accordingly, the right-holder." (footnote omitted)); Gervais, *supra* note 1, at 2068 ("As applied by courts, originality requires human authorship." (emphasis omitted) (footnote omitted)).

90. Dornis, *supra* note 89, at 17 ("Copyright protection in virtually all jurisdictions depends on the quintessential element of human creativity. Both civil-law and common-law copyright have an anthropocentric foundation.").

91. See William Fisher, *Theories of Intellectual Property*, in NEW ESSAYS IN THE LEGAL AND POLITICAL THEORY OF PROPERTY 168, 171 (Stephen R. Munzer ed., 2001).

92. See Justin Hughes, *The Philosophy of Intellectual Property*, 77 GEO. L.J. 287, 330-31 (1988); see also generally Christopher S. Yoo, *Rethinking Copyright and Personhood*, 2019 U. ILL. L. REV. 1039 (explaining copyright law justification that creative works develop individuals' self-actualization).

93. See Craig & Kerr, *supra* note 1, at 86 ("To say authorship is human, that it is fundamentally connected with *humanness* . . . is to say that human communication is the very point of authorship as a social practice—indeed, as a condition of life.").

94. See JOHN LOCKE, TWO TREATISES OF GOVERNMENT 20-21 (Ian Shapiro ed., Yale Univ. Press 2003) (1690); ROBERT NOZICK, ANARCHY, STATE, AND UTOPIA 178 (1974); Wendy J. Gordon, *A Property Right in Self-Expression: Equality and Individualism in the Natural Law of Intellectual Property*, 102 YALE L.J. 1533, 1544-45 (1993).

95. *Millar v. Taylor* (1769) 98 Eng. Rep. 201, 252 (KB).

96. Berne Convention for the Protection of Literary and Artistic Works, September 9, 1886, as revised at Paris July 24, 1971, 1161 U.N.T.S. 3 [hereinafter Berne Convention].

97. Jane C. Ginsburg, *People Not Machines: Authorship and What It Means in the Berne Convention*, 49 INT'L REV. INTELL. PROP. & COMPETITION L. 131, 131 (2018); Gervais, *supra* note 1, at 2073.

his works.”⁹⁸ It also makes clear that moral rights refer to “the right to claim authorship of the work and to object to any distortion, mutilation or other modification of, or other derogatory action in relation to, the said work, which would be prejudicial to *his* honor or reputation.”⁹⁹ Copyright is also protected as a human right.¹⁰⁰ The Universal Declaration of Human Rights states that “[*e*]veryone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which *he* is the author.”¹⁰¹

Domestic copyright laws are also structured on the basis of a human-centric notion of authorship.¹⁰² The U.S. Supreme Court has proclaimed that “[a]s a general rule, the author is the party who actually creates the work, that is, *the person* who translates an idea into a fixed, tangible expression entitled to copyright protection.”¹⁰³ Courts have resoundingly refuted legal challenges to this notion of authorship.¹⁰⁴ For instance, the emergence of computer-generated works raised questions about whether computers could be regarded as authors of such works. In *Goldstein v. California*, the Supreme Court “interpreted [the authorship requirement] to include any physical rendering of the fruits of creative intellectual or aesthetic labor,”¹⁰⁵ reasoning that in most cases significant input from an author or user would be required for a computer to generate any kind of copyrightable work.¹⁰⁶

In the recent *Naruto v. Slater* case, the Ninth Circuit Court of Appeals addressed whether animals could be identified as authors of works they

98. Berne Convention, *supra* note 97, art. 2 (emphasis added). The use of “his” in the Berne Convention refers to both men and women.

99. *Id.* at 36 (emphasis added).

100. See LAURENCE R. HELFER & GRAEME W. AUSTIN, HUMAN RIGHTS AND INTELLECTUAL PROPERTY: MAPPING THE GLOBAL INTERFACE 86–87 (2011).

101. G.A. Res. 217 (III) A, Universal Declaration of Human Rights, art. 27(2) (Dec. 10, 1948) [hereinafter UDHR] (emphasis added).

102. See Gervais, *supra* note 1, at 2073–85.

103. *Comty. for Creative Non-Violence v. Reid*, 490 U.S. 730, 737 (1989) (emphasis added); see also *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 61 (1884) (“[A]nd Lord Justice Bowen says that photography is to be treated for the purposes of the act as an art, and the author is the man who really represents, creates, or gives effect to the idea, fancy, or imagination.”).

104. See *Urantia Found. v. Maaherra*, 114 F.3d 955, 958 (9th Cir. 1997) (“For copyright purposes, however, a work is copyrightable if copyrightability is claimed by the first human beings who compiled, selected, coordinated, and arranged the [work] . . .”); *Kelley v. Chi. Park Dist.*, 635 F.3d 290, 304 (7th Cir. 2011) (“Authors of copyrightable works must be human; works owing their form to the forces of nature cannot be copyrighted.”).

105. *Goldstein v. California*, 412 U.S. 546, 561 (1973).

106. See *id.*; see also Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1199 (1986) (“[I]t is still fair to say that it was not within Congress’ contemplation to grant intellectual property rights to machines. In the long history of the copyright system, rights have been allocated only to humans.”); Steve Schlackman, *Who Holds the Copyright in AI Created Art*, ART BUS. J., <https://abj.artrepreneur.com/the-next-rembrandt-who-holds-the-copyright-in-computer-generated-art/> [<https://perma.cc/ZQ5H-L7JL>].

“create.”¹⁰⁷ “Naruto was a seven-year-old crested macaque” in Indonesia that took several photographs of itself using wildlife photographer David Slater’s unattended camera.¹⁰⁸ Slater published a book containing these photos, which led the People for the Ethical Treatment of Animals to sue him on Naruto’s behalf for copyright infringement.¹⁰⁹ The Ninth Circuit ruled that Naruto did not have the necessary standing, employing a literal interpretation of the Copyright Act. It reasoned that “if an Act of Congress plainly states that animals have statutory standing, then animals have statutory standing[, but i]f the statute does not so plainly state, then animals do not have statutory standing.”¹¹⁰ The court then identified language in the Copyright Act that reflected the intentions of lawmakers, noting that “[t]he terms ‘children,’ ‘grandchildren,’ ‘legitimate,’ ‘widow,’ and ‘widower’ all imply humanity and necessarily exclude animals that do not marry and do not have heirs entitled to property by law.”¹¹¹ This conclusion does not suggest that it is impossible for non-human entities to hold copyright, but demonstrates the court’s belief that it would only be possible should the legislature choose to introduce a new law.¹¹²

EU law also embraces the human-centric notion of authorship. Referring to photographic works, the EU Copyright Term Directive¹¹³ indicates that such a work “is to be considered original if it is the author’s own intellectual creation reflecting his personality, no other criteria such as merit or purpose being taken into account.”¹¹⁴ Some scholars hold the view that the EU Software Directive¹¹⁵ and Database Directive¹¹⁶ stipulate the human author requirement.¹¹⁷ Relying on these laws, the European Court of Justice (“ECJ”) has applied this requirement to all types of works, defining a copyrightable

107. *Naruto v. Slater*, 888 F.3d 418, 420 (9th Cir. 2018).

108. *Id.*

109. *Id.*

110. *Id.* at 426.

111. *Id.*

112. Paul T. Babie, *The “Monkey Selfies”: Reflections on Copyright in Photographs of Animals*, 52 U.C. DAVIS L. REV. ONLINE 103, 116 (2018); see Shyamkrishna Balganes, *Causing Copyright*, 117 COLUM. L. REV. 1, 73–74 (2017) (discussing the presumptions statutes create).

113. Directive 2006/116, of the European Parliament and of the Council of 12 December 2006 on the Term of Protection of Copyright and Certain Related Rights, art. 6, 2006 O.J. (L 372) 12, 14 (EC).

114. *Id.* ¶ 16, at 13.

115. Directive 2009/24, of the European Parliament and of the Council of 23 April 2009 on the Legal Protection of Computer Programs, art. 1 ¶ 3, 2009 O.J. (L 111) 16, 18 (EC).

116. Council Directive 96/9, of the European Parliament and of the Council of 11 March 1996 on the Legal Protection of Databases, art. 3 ¶ 1, 1996 O.J. (L 77) 20, 25 (EC).

117. See Patrick Zurth, *Artificial Creativity? A Case Against Copyright Protection for AI-Generated Works*, 25 UCLA J.L. & TECH., Spring 2021, at 1, 4.

work as an “author’s own intellectual creation”¹¹⁸ and holding that “the author . . . can stamp the work created with his ‘personal touch.’”¹¹⁹

Despite ongoing advancements in AI creativity, certain state authorities have relied on the human-centric notion of authorship to refuse extending copyright protection beyond works created by humans. The U.S. Copyright Office has stated that, as section 306 of the Copyright Act protects only original works of authorship, it will not register works produced by nature, animals, plants, or machines or mechanical processes that operate without any creative intervention from a human author.¹²⁰ The 2020 EU report on IP and AI mentions that “the copyright principle of originality . . . is linked to a natural person,” and that intellectual creations reflect an individual’s personality.¹²¹ The report stresses that human authors and producers must serve as the basis for the IP rights system,¹²² and that a human-centered approach to AI is needed to ensure that it “remain[s] a tool that serves people and the common good.”¹²³

ii. *In Favor of AI Authorship*

There is still broad support for the protection of works created by AI systems. Some commentators suggest that legislation of the UK, Ireland, and New Zealand may already address these works.¹²⁴ Copyright provisions relating to computer-generated works originated in the mid-twentieth century when computers were introduced as tools in the creative process. For example, UK copyright law defines a computer-generated work as a “work . . . generated by a computer in circumstances such that there is no human

118. Case C-5/08, *Infopaq Int’l A/S v. Danske Dagblades Forening*, 2009 E.C.R. I-6624, ¶ 35.

119. Case C-145/10, *Painer v. Standard VerlagsGmbH*, 2011 E.C.R. I-12594, ¶ 92; *see also* Case C-604/10, *Football Dataco Ltd. v. Yahoo! UK Ltd.*, ECLI:EU:C:2012:115, ¶ 38 (Mar. 1, 2012) (“[The] criterion of originality is satisfied when, through the selection or arrangement of the data which it contains, its author expresses his creative ability in an original manner by making free and creative choices . . . and thus stamps his ‘personal touch.’” (citation omitted)).

120. U.S. COPYRIGHT OFF., COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICES §§ 306, 313.2 (3d ed. 2021) (stating that “the Office will refuse to register a claim if it determines that a human being did not create the work” and “the Office will not register works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author”).

121. EUROPEAN PARLIAMENT COMM. ON LEGAL AFFS., REPORT ON INTELLECTUAL PROPERTY RIGHTS FOR THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES 9 (Oct. 2, 2020), https://www.europarl.europa.eu/doceo/document/A-9-2020-0176_EN.pdf [<https://perma.cc/D9AW-SMGJ>].

122. *See id.* at 24–25.

123. *Id.* at 5.

124. *See* Richard Hoad & Sarah Martine, *The Authorless Song: Artificial Intelligence and Australia’s Copyright Law Regime*, CLAYTON UTZ (May 14, 2020), <https://www.claytonutz.com/knowledge/2020/may/the-authorless-song-artificial-intelligence-and-australias-copyright-law-regime> [<https://perma.cc/6QJJ-HQM7>].

author of the work.”¹²⁵ With regard to authorship of the computer-generated work, the law stipulates that “the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.”¹²⁶ Such provisions could be invoked to identify AI developers as authors of AI-generated works.¹²⁷

Copyright provisions relating to computer-generated works largely addressed difficulties in identifying the contribution of an author rather than the absence of any human contribution.¹²⁸ While opponents of copyright protection of AI works might emphasize this distinction, proponents argue that, from a historical perspective, the fixation on the requirement of “human involvement” has been detrimental to the development of copyright law.¹²⁹ Such development, the argument goes, will once more be disrupted if AI works are denied copyright protection for failure to meet this requirement.¹³⁰ European lawmakers have already acknowledged the potential of AI-generated creations, as with “traditional” creations, in expanding cultural heritage, and their commensurate entitlement to some form of copyright protection.¹³¹

Other proponents of copyright protection of AI-generated works have directly rejected the human-centric notion of authorship, arguing that technological developments necessitate recognition of AI authors. As copyright evolves with technology, the notion of authorship should be adapted to technological developments, paving the way for recognition of AI authorship.¹³² Annemarie Bridy, for instance, points out that

125. Copyright, Designs and Patents Act 1988, c. 48, § 178(b) (U.K.).

126. *Id.* § 9(3).

127. See Hoard & Martine, *supra* note 124.

128. Vitor Palmela Fidalgo, *Worldwide: Copyrights Protection of Works Generated by Artificial Intelligence*, MONDAQ (Mar. 18, 2019), <https://www.mondaq.com/new-technology/790660/copyrights-protection-of-works-generated-by-artificial-intelligence> [<https://perma.cc/4SVW-VAUE>]; Paul Lambert, *Computer-Generated Works and Copyright: Selfies, Traps, Robots, AI and Machine Learning*, 39 EUROPEAN INTELL. PROP. REV. 12, 18 (2017).

129. Madeleine de Cock Buning, *Artificial Intelligence and the Creative Industry: New Challenges for the EU Paradigm for Art and Technology by Autonomous Creation*, in RESEARCH HANDBOOK ON THE LAW OF ARTIFICIAL INTELLIGENCE 511, 533 (Woodrow Barfield & Ugo Pagallo eds., 2018).

130. *Id.* (“When newly emerged machines or devices contributed to the creation of artifacts of art, science or literature in some way or the other, this again gave rise to reflections on the copyright law requirement of human presence in the creation process. It has more than once led to the rejection of the protection of works that were created with *the aid of* a machine, as we saw with the introduction of photography, and the first discussion on copyright protection for computer-assisted works. Partially due to a lack of understanding of the technology used for the creation of works, the anthropocentric requirement was staged to impede protection . . .”).

131. See EUROPEAN PARLIAMENT COMM. ON LEGAL AFFS., *supra* note 121, at 13 (“At a time when artistic creation by AI is becoming more common [(citing the example of the ‘Next Rembrandt’)], we seem to be moving towards an acknowledgement that an AI-generated creation could be deemed to constitute a work of art on the basis of the creative result rather than the creative process.”).

132. Bridy, *supra* note 2, at 3.

As the state of the art continues to advance in AI and related areas . . . we are moving incrementally but surely into an age of digital authorship, in which digital works (i.e., software programs) will, relatively autonomously, produce other works that are indistinguishable from works of human authorship.¹³³

Therefore, the advancements in AI leads to the question as to how copyright law should evolve to protect works created by AI.¹³⁴ Drawing on the idea of technological disruption, Margot Kaminski acknowledges a similar possibility, claiming “the U.S. copyright system has already moved far enough away from romantic authorship for algorithmic authorship to be, perhaps surprisingly, not fundamentally disruptive.”¹³⁵

Some proponents also argue that the labor and personality theories of IP rights should not preclude protection of AI-generated creations entirely. They suggest it would be an oversimplification of the creative process to ignore the work contributed by human programmers at the development stage, noting that the absence of a human element would not matter in the case of neighboring or related “rights . . . not founded on the classic paradigm of romantic authorship.”¹³⁶

This has led to a proposal for a new category of neighboring right to prevent AI works being exploited that “cover[s] all manifestations of artificial creativity, especially where the level of actual creativity is high, such as AI art and music.”¹³⁷ The aforementioned EU report echoes this view, recommending “a horizontal, evidence-based and technologically neutral approach to [the current] copyright provisions applicable to AI-generated works.”¹³⁸ The report suggests that “[t]he essential [requirement] for protection would be the existence of an autonomous *artificial* creation,” proposing the 15-year term of protection granted to databases as an “eligible parallel.”¹³⁹

From a utilitarian stance, some proponents argue that copyright protection of AI-generated works would provide the incentive necessary to ensure their production and dissemination.¹⁴⁰ Although making AI works freely accessible would create static efficiency as maximum supply guarantees minimum prices, limiting the analysis to freedom of access ignores the public’s interest in dynamic efficiency which would ensure “the continuous production of [new]

133. *Id.* at 27 (“The increasing sophistication of generative software and the reality that all creativity is algorithmic compel recognition that AI-authored works are less heterogeneous to both their human counterparts and existing copyright doctrine than appearances may at first suggest.”).

134. *Id.* at 3.

135. Kaminski, *supra* note 2, at 603.

136. Dornis, *supra* note 89, at 31–32.

137. *Id.* at 45.

138. See EUROPEAN PARLIAMENT COMM. ON LEGAL AFFS., *supra* note 121, at 26.

139. Dornis, *supra* note 89, at 45, 57.

140. See *infra* notes 148–50 and accompanying text.

creative works.”¹⁴¹ In response to the argument that protecting AI-generated works would reward AI developers twice, proponents of protection emphasize that “the expected monopoly rent must reach at least the amount of investment[],” and non-protection might significantly reduce the overall investment in this area.¹⁴² Furthermore, it is also argued that in addition to promoting the development of AI systems, granting protection to the generated works would incentivize owners to exercise proper control over them.¹⁴³ While companies would do this in order to maximize revenue from their AI systems, the control they exercise could also help to prevent the systems being used for unsavory, copyright-damaging purposes, such as the copying of existing works.¹⁴⁴

2. Ownership

Beyond authorship, policymakers and commentators disagree about who should be deemed the copyright owner of an AI-generated work. In the EU, there are calls for the European Parliament to assess whether the copyright of such works should be automatically assigned to the copyright holder of the AI software (such as the AI developer), as per the EU’s human-centered approach to copyright.¹⁴⁵ From a labor and personality theory perspective, the AI and its creations are the fruits of the programmer’s intellectual labor or a reflection of their personality, respectively; therefore, the programmer should be entitled to a property right in the AI’s creations in the form of copyright.¹⁴⁶ From a utilitarian perspective, granting programmers copyright would incentivize them to continue to research and develop AI, as well as take responsibility for works of the AI.¹⁴⁷ The presumption here is that machines are processes designed by humans to accomplish specific tasks,¹⁴⁸ and are therefore the “perfect agents” of the developer.¹⁴⁹

An important consideration when determining ownership is whether there is a causal connection between the AI developer and the AI work. The labor or personality approach is only justified if there is a sufficient causal link between the programmer’s intellectual efforts and the AI creation. If AI

141. See Dornis, *supra* note 89, at 34; Kaminski, *supra* note 2, at 603.

142. Dornis, *supra* note 89, at 35–37.

143. 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 MICH. ST. L. REV. 659, 701.

144. *Id.* at 703–04.

145. See EUROPEAN PARLIAMENT COMM. ON LEGAL AFFS., *supra* note 121, at 25.

146. See Dornis, *supra* note 89, at 34.

147. See Begoña González Otero & João Pedro Quintais, *Before the Singularity: Copyright and the Challenges of Artificial Intelligence*, KLUWER COPYRIGHT BLOG (Sept. 25, 2018), <http://copyright.blog.kluweriplaw.com/2018/09/25/singularity-copyright-challenges-artificial-intelligence> [<https://perma.cc/4CR3-PD8V>].

148. See Ginsburg & Budiardjo, *supra* note 1, at 395–405.

149. *Id.* at 400.

programs use input data that was not accounted for by the programmer to create unexpected outputs, the causal relationship will be too distant to justify ownership by the developer in the AI systems.¹⁵⁰ For example, in 2017 a system was invented that learned how to rewrite its own code by stealing from other programs.¹⁵¹ There is also the future possibility of “artificially intelligent Creative Agents”¹⁵² requiring no human input in the creation process whatsoever such that no causal link between an AI programmer and AI work can be properly established.

An alternative proposal would be to extend the work-made-for-hire doctrine to cover works made by AI. Commentators have suggested that there is a similarity between AI creativity and work-made-for-hire scenarios which would make the doctrine suitable for this purpose, but they also note that a statutory amendment to the U.S. Copyright Act to cover AI would be necessary as analogous application of the rule is not possible.¹⁵³ Under the work-made-for-hire doctrine, the employer or commissioner of the author of the work is directly assigned copyright with no prior materialization of rights for the actual creator, even in the absence of creative input from the employer or commissioner.¹⁵⁴ Applying this doctrine to AI works would “incentivize the employer . . . at whose instance, direction, use, commercial purposes or risk the work is prepared [and] give them control over the commercial force” of the works while also ensuring their accountability over the works.¹⁵⁵

B. LESSONS FROM THE RECENT AI RULINGS

While policy and academic debate has raged over the copyrightability of AI-generated works, there have been no judicial or administrative rulings that illustrate which arguments offer a plausible basis for determining the legal status of AI-generated works under copyright law. The recent landmark ruling in *Naruto v. Slater* clarifies human agency as being central to authorship.¹⁵⁶ However, it does not address whether artificial consciousness or intelligence constitutes a legal personality and, if so, whether “this legal personality retain[s] all of the attendant rights and obligations/duties of a natural person[.]”¹⁵⁷ If courts adopt the same literal interpretation of the Copyright

150. See Yanisky-Ravid, *supra* note 143, at 701.

151. See Matt Reynolds, *AI Learns to Write Its Own Code by Stealing from Other Programs*, NEWSIDENTIST (Feb. 22, 2017), <https://www.newsidentist.com/article/mg23331144-500-ai-learns-to-write-its-own-code-by-stealing-from-other-programs> [<https://perma.cc/3V2C-EJBD>].

152. See de Cock Buning, *supra* note 129, at 518.

153. *Id.* at 531.

154. *Id.*

155. See Yanisky-Ravid, *supra* note 143, at 711–12.

156. See Balganes, *supra* note 112, at 3–4, 4 n.10.

157. Babie, *supra* note 112, at 116 (footnote omitted); see also Victor M. Palace, Note, *What If Artificial Intelligence Wrote This? Artificial Intelligence and Copyright Law*, 71 FLA. L. REV. 217, 226 (2019) (arguing that *Naruto v. Slater* does not deal with AI, but rather nonhuman authorship).

Act in future AI copyright cases, they must similarly conclude that, as non-human entities, AI systems do not have standing to sue for copyright infringement, nor can they be recognized as copyright owners of works they generate. However, the issue is slightly more complicated in the context of AI as “there is a human creator behind the AI” itself.¹⁵⁸ As the first judicial decision to directly tackle the problem, the *Dreamwriter* ruling provides an important analytical approach to determining both authorship and ownership of AI-generated works.

The *Dreamwriter* ruling confirmed that the existence of human contribution is key to deciding whether an AI-generated work has necessary authorship to merit copyright protection.¹⁵⁹ Per *Dreamwriter*, the first step in determining available copyright protection is to examine whether there is human contribution to the creation of the work.¹⁶⁰ The court found that although it took only two minutes for Dreamwriter to run established rules, algorithms, and templates to automatically create the article in question, this was not an isolated process.¹⁶¹ Rather, Tencent, as the developer of the AI technology embodied in Dreamwriter, had arranged a team of creative professionals who handled data input and set templates and styles for the automatic generation of works.¹⁶²

Second, the degree of human contribution is the predominant factor in deciding the work’s copyrightability.¹⁶³ The court found that the form of the Dreamwriter article had been determined by Tencent’s creative team, and this form, while not unique, had a certain originality.¹⁶⁴ The court held that the antecedent processes of this team determined the expression of the article, and it was this human element that made the article eligible for copyright.¹⁶⁵

The *Dreamwriter* ruling also relies on human organization of and responsibility for the creation of AI works.¹⁶⁶ The Chinese court held that the article was completed under the auspices of the Tencent creating team, including the editorial team, production team, and technical development team, using Dreamwriter, and fully reflected Tencent’s intention to publish stock review articles.¹⁶⁷ It was published on the Tencent.com Securities Channel with an end note stating: “This article was automatically written by

158. See Matthew P. Hooker, Note, *Naruto v. Slater: One Small Step for a Monkey, One Giant Lawsuit for Animal-Kind*, 10 WAKE FOREST L. REV. ONLINE 15, 30 (2020).

159. See *supra* Section II.A.

160. See *supra* Section II.A.

161. See *supra* Section II.A.

162. See *supra* Section II.A.

163. See *supra* Section II.A.

164. See *supra* Section II.A.

165. See *supra* Section II.A.

166. See *supra* Section II.A.

167. See *supra* Section II.A.

Tencent's robot Dreamwriter."¹⁶⁸ In the absence of evidence to the contrary, the court determined that Tencent organized and took responsibility for the article and therefore Tencent should be deemed copyright owner of the news article created by Dreamwriter.¹⁶⁹

While filling the legal void left by judicial decisions such as *Naruto v. Slater*, the *Dreamwriter* ruling thus shows how courts can apply the human contribution standard to determine the ownership of AI-generated works. Indeed, even in countries with laws receptive to computer-generated works, some human contribution is necessary for copyright to exist.¹⁷⁰ For example, copyright laws in the UK, Ireland, and New Zealand require that the author of computer-generated works "be the person by whom the arrangements necessary for the creation of the work are undertaken."¹⁷¹ Similarly, an EU report has proposed the possibility of "granting copyright [in an AI-generated work] to the natural person who prepares and publishes it lawfully"¹⁷²

IV. CREATING A TWO-TIERED MECHANISM FOR PROTECTING AI CREATIONS

As the preceding Part shows, the *Dreamwriter* ruling has shed new light on the issues of authorship and ownership, holding the AI-generated work in question to be copyrightable and deeming the developer of the AI the copyright owner of the work.¹⁷³ However, the ruling does not address how to differentiate AI-generated works from traditional works created by machines that do not have human intelligence, like cameras. Should AI-generated works enjoy full copyright protection as pictorial and computer-generated works do? If AI developers do not make the major intellectual contributions to AI-generated works, should they enjoy full or limited copyright protection and, if the latter, should copyright law be adjusted? A more perplexing issue not tackled by the *Dreamwriter* ruling concerns how copyright law should protect works that are created solely by autonomous AI without any human contribution.

In this Part, I seek to offer a broad-based, forward-looking approach to protecting AI-generated works through a two-tiered mechanism. First, I propose that legislators should enact law to create a new *sui generis* right to protect AI creations generated with human contribution. Second, I argue that legislators should advocate for the adoption of a proposal that works autonomously generated by AI without human contribution should be placed in the public domain.

168. *Dreamwriter* ruling, *supra* note 17, at 1.

169. *See supra* Section II.A.

170. *See Dornis, supra* note 89, at 17–18.

171. *See* Copyright, Designs and Patent Act 1988, § 9(3) (U.K.); Copyright and Related Rights Act 2000, § 21(f) (Act No. 28/2000) (Ir.); Copyright Act 1994, s. 5(2)(a) (N.Z.).

172. *See* EUROPEAN PARLIAMENT COMM. ON LEGAL AFFS., *supra* note 121, at 13.

173. *See supra* Section III.B.

A. “SUI GENERIS” RIGHTS

1. *Sui Generis* Protection of IP Rights

Traditionally, IP law encompasses copyrights, trademarks, patents, and trade secrets as the core of protectible subject matter, along with protection against unfair competition.¹⁷⁴ IP law and its subject matter, however, are not immutable. Rather, IP protection mechanisms should be updated or adapted to respond to new forms of creativity and innovation. Accordingly, a broad array of *sui generis* rights have been created to protect new subject matter.¹⁷⁵

“*Sui generis*” is a Latin phrase meaning “of its own kind or class.”¹⁷⁶ In IP law, a *sui generis* system protects rights that fall outside of conventional IP rights in copyrighted works, patents, trademarks, and trade secrets.¹⁷⁷ Over the last few decades, advances in technology have given rise to new forms of IP whose unique characteristics do not fit neatly into the conventional IP regime.¹⁷⁸ *Sui generis* rights have been created to incentivize creativity and innovation by enacting specific statutes to protect these non-traditional forms of IP.¹⁷⁹ In the United States and Europe, for example, *sui generis* protection has been applied to mask works,¹⁸⁰ vessel hull designs,¹⁸¹ fashion designs,¹⁸² plant varieties,¹⁸³ and databases.¹⁸⁴

The legal protection of databases in the EU illustrates the importance of *sui generis* rights. Databases are a vital tool in the development of an information market. Compiling exponentially growing volumes of data into databases organizes the data in a systematic way, enables its retrieval, and

174. Peter Drahos, *The Universality of Intellectual Property Rights: Origins and Development*, in INTELLECTUAL PROPERTY AND HUMAN RIGHTS 13, 13 (1998), https://www.wipo.int/edocs/pubdocs/en/wipo_pub_762.pdf [<https://perma.cc/TB5K-ECM6>].

175. INTERGOVERNMENTAL COMM. ON INTELL. PROP. & GENETIC RES., TRADITIONAL KNOWLEDGE & FOLKLORE, WORLD INTELL. PROP. ORG., ELEMENTS OF A *SUI GENERIS* SYSTEM FOR THE PROTECTION OF TRADITIONAL KNOWLEDGE ¶ 18 (2002), https://www.wipo.int/edocs/mdocs/tk/en/wipo_grtkf_ic_3/wipo_grtkf_ic_3_8 [<https://perma.cc/PPK8-CYN9>].

176. *Glossary*, WORLD INTELL. PROP. ORG., <https://www.wipo.int/tk/en/resources/glossary.html#sui-generis> [<https://perma.cc/NE8X-29M6>] (referencing Black’s Law Dictionary’s definition of “*sui generis*”).

177. *Id.*

178. *See supra* Section III.A.1.

179. Lindsey Schuler, Note, *Modern Age Protection: Protecting Indigenous Knowledge Through Intellectual Property Law*, 21 MICH. ST. INT’L L. REV. 751, 755 (2013).

180. *See, e.g.*, Semiconductor Chip Protection Act of 1984, Pub. L. No. 98-620, 98 Stat. 3347 (1984) (codified at 17 U.S.C. §§ 901–914 (2018)).

181. *See, e.g.*, Vessel Hull Design Protection Act, Pub. L. No. 105-304, 112 Stat. 2905 (1998) (codified as amended at 17 U.S.C. §§ 1301–1332 (2018)).

182. *See, e.g.*, CODE DE LA PROPRIÉTÉ INTELLECTUELLE [CPI] [Intellectual Property Code] art. L1112-2 (Fr.).

183. *See, e.g.*, Plant Variety Protection Act, Pub. L. No. 91-577, 84 Stat. 1542 (1970) (codified as amended at 7 U.S.C. §§ 2321–2582 (2018)).

184. Council Directive 96/9, of the European Parliament and of the Council of 11 March 1996 on the Legal Protection of Databases, ch. 3, 1996 O.J. (L 77) 25–27 (EC).

thereby enhances its utility and value. Collecting, processing, selecting and arranging the contents in databases may require substantive investment, but traditional IP rights are ill-suited to protect them. Some databases fall short of originality in the selection and arrangement of the underlying contents and thus cannot be copyrighted, while patent law offers no alternative because patent protection does not apply to the presentation of information.

To foster the growth of the EU database industry, it was considered necessary to strengthen the legal protection of databases.¹⁸⁵ In 1988, the European Commission examined whether the selection and arrangement of the content within a database should be protected by copyright and whether a database should be protected by copyright or a new *sui generis* right regardless of whether the database contained material unprotected by copyright.¹⁸⁶ The consultation and negotiation led to the adoption of Directive 96/9/EC on the legal protection of databases, which harmonizes laws relating to the protection of copyright in databases and creates a *sui generis* database right within the European Community.¹⁸⁷

In contrast with copyright, which affords protection to databases that “by reason of the selection or arrangement of their contents, constitute the author’s own intellectual creation,”¹⁸⁸ the *sui generis* database right requires the database developer or owner to show that “there has been qualitatively and/or quantitatively a substantial investment in either the obtaining, verification or presentation of the contents” of the database.¹⁸⁹ This *sui generis* right is independent of copyright and any other IP rights. It protects the contents of a database and operates irrespective of whether the database or any of its content is copyrighted.¹⁹⁰ No registration is required for a database right,¹⁹¹ which prohibits an unauthorized party from extracting or reutilizing all, or a substantial part, of the contents of the database.¹⁹² This *sui generis* protection lasts for 15 years.¹⁹³

185. See J.H. Reichman & Pamela Samuelson, *Intellectual Property Rights in Data?*, 50 VAND. L. REV. 51, 72–74 (1997).

186. 1 NICHOLAS CADDICK, GWILYM HARBOTTLE & UMA SUTHERSANEN, COPINGER AND SKONE JAMES ON COPYRIGHT § 18-07 (18th ed. 2020), Westlaw (database updated 2021).

187. See Council Directive 96/9, of the European Parliament and of the Council of 11 March 1996 on the Legal Protection of Databases, ch. 2–3, 1996 O.J. (L 77) 25–27 (EC).

188. *Id.* art. 3(1), at 25.

189. *Id.* art. 7(1), at 25–26.

190. See *id.* art. 7(4), at 26.

191. See *id.* art. 10(1), at 26.

192. See *id.* art. 7(1), at 25–26.

193. *Id.* art. 10.

2. *Sui Generis* Right for AI Creations with Human Contributions

With respect to AI-generated works, some leading scholars argue that current AI technology could be used as a tool, noting that other tools, such as Photoshop and GarageBand, have been used in the past to create copyrightable works.¹⁹⁴ These tools lack creativity, which instead comes from the humans who control the tools' creation of works.¹⁹⁵ AI-generated production that occurs in this way is still subject to the creative direction of a human actor and is arguably no different from using pens for writing or cameras for photography. However, there are major differences between wholly AI-generated works and those works created by the aforementioned software and machines like cameras and computers. Given these differences, I propose three arguments for why legislators should consider creating a new *sui generis* right to protect AI works under the existing copyright protection mechanism.

First, while AI developers set up the initial programming, AI systems that are equipped with machine learning capacities contribute much to the creation of works. AI became a pervasive technology in the past ten years or so because of the breakthrough development of deep learning.¹⁹⁶ This machine learning technique uses deep neural networks with multiple layers between the input and output layers to emulate the structure, functions, and workings of the human brain enabling an AI system to learn and make decisions on its own.¹⁹⁷ The increased availability of large amounts of training

194. Ginsburg & Budiardjo, *supra* note 1, at 403 (“Machines are tools of their programmers or of their users, and *understanding* or *explainability* is not a prerequisite for authorial control of a tool Copyright’s long acceptance of the use of tools and amanuenses is the most appropriate lens through which to deal with the potential problems of machine creation.”); see Hanson & Jung, *supra* note 87.

195. Gervais, *supra* note 1, at 2093 (“[T]he creation process must be human.” (emphasis omitted)); Ginsburg & Budiardjo, *supra* note 1, at 398 (“Any apparent ‘creativity’ in a machine’s output is directly attributable either to the code written by the programmers who designed and trained the machine, or to the instructions provided by the users who operate the machine. No machine is itself a source of creativity.” (emphasis omitted)).

196. See KAI-FU LEE, AI SUPERPOWERS: CHINA, SILICON VALLEY, AND THE NEW WORLD ORDER 9 (2018); MARCUS DU SAUTOY, THE CREATIVITY CODE: ART AND INNOVATION IN THE AGE OF AI 280 (2019) (“The new ideas of machine learning challenge many of the traditional arguments that machines can never be creative.”).

197. Tabrez Y. Ebrahim, *Artificial Intelligence Inventions & Patent Disclosure*, 125 PENN. ST. L. REV. 147, 172 (2020) (“Deep learning, which is a subset of and the state of the art of machine learning, refers to extracting complex patterns from massive volumes of data by emulating the human brain’s ability to observe, analyze, learn, and make decisions.”); Eli David, *How the Future of Deep Learning Could Resemble the Human Brain*, FORBES (Nov. 11, 2020, 7:00 AM), <https://www.forbes.com/sites/forbestechcouncil/2020/11/11/how-the-future-of-deep-learning-could-resemble-the-human-brain/?sh=386555cc415c> [https://perma.cc/AE96-2KLN] (“Over the last several years, deep learning — a subset of machine learning in which artificial neural networks imitate the inner workings of the human brain to process data, create patterns and inform decision-making — has been responsible for significant advancements in the field of artificial intelligence.”).

data and massive computational power have greatly promoted the development of AI's deep learning capacities.¹⁹⁸ Current AI systems apply algorithms to automatically learn and to improve performance through experience by receiving feedback without being explicitly programmed.¹⁹⁹

Some AI systems can even write and rewrite their own algorithms to improve performance.²⁰⁰ In their application of deep learning and neural networks, AI systems are considered black boxes because they are constantly evolving by learning and adapting for themselves, and these processes are opaque.²⁰¹ The original human programmers would have little idea about what exactly the underlying AI algorithms are and how such algorithms function in decision-making.²⁰²

As AI systems have increased in sophistication, they have evolved into something other than a mere tool of human creators.²⁰³ They are able to mimic human intelligence and creativity to generate new original works, such as news reports,²⁰⁴ poems,²⁰⁵ paintings,²⁰⁶ and music.²⁰⁷ Some AI creations are now indistinguishable from human works. For example, in 2016, about 350

198. Ryan Calo, *Artificial Intelligence Policy: A Primer and Roadmap*, 51 U.C. DAVIS L. REV. 399, 402 (2017) ("First, as is widely remarked, a vast increase in computational power and access to training data has led to practical breakthroughs in machine learning, a singularly important branch of AI").

199. Jessica L. Gilotte, Note, *Copyright Infringement in AI-Generated Artworks*, 53 U.C. DAVIS L. REV. 2655, 2660 (2020) ("During machine learning, the AI program receives feedback and refines its underlying algorithm to improve its performance of the defined task over time.").

200. Will Knight, *The Dark Secret at the Heart of AI*, MIT TECH. REV. (Apr. 11, 2017), <https://www.technologyreview.com/s/604087/the-dark-secret-at-the-heart-of-ai> [<https://perma.cc/TE86-Z776>]; Dom Galeon, *New AI Can Write and Rewrite Its Own Code to Increase Its Intelligence*, FUTURISM (Feb. 16, 2017), <https://futurism.com/new-ai-can-write-and-rewrite-its-own-code-to-increase-its-intelligence> [<https://perma.cc/S43E-K4LS>].

201. Kartik Hosanagar & Vivian Jair, *We Need Transparency in Algorithms, but Too Much Can Backfire*, HARV. BUS. REV. (July 25, 2018), <https://hbr.org/2018/07/we-need-transparency-in-algorithms-but-too-much-can-backfire> [<https://perma.cc/B7VM-Z2KC>].

202. Samantha Fink Hedrick, *I "Think," Therefore I Create: Claiming Copyright in the Outputs of Algorithms*, 8 N.Y.U. J. INTELL. PROP. & ENT. L. 324, 371 (2019).

203. See Knight, *supra* note 200 ("Instead of a programmer writing the commands to solve a problem, the program generates its own algorithm based on example data and a desired output. The machine-learning techniques that would later evolve into today's most powerful AI systems followed the latter path: the machine essentially programs itself.").

204. See, e.g., Jaclyn Peiser, *The Rise of the Robot Reporter*, N.Y. TIMES (Feb. 5, 2019), <https://www.nytimes.com/2019/02/05/business/media/artificial-intelligence-journalism-robots.html> [<https://perma.cc/7L7S-F99L>].

205. See, e.g., Matt Burgess, *Google's AI Has Written Some Amazingly Mournful Poetry*, WIRED (May 16, 2016, 11:09 AM), <https://www.wired.co.uk/article/google-artificial-intelligence-poetry> [<https://perma.cc/K8MJ-RL33>].

206. See, e.g., Nadja Sayej, *Vincent van Bot: The Robots Turning Their Hand to Art*, GUARDIAN (Feb. 22, 2018, 12:14 PM), <https://www.theguardian.com/artanddesign/2016/apr/19/robot-art-competition-e-david-cloudpainter-bitpainter> [<https://perma.cc/3JAA-VPND>].

207. See, e.g., Dani Deahl, *This New Alexa Skill Will Play Music Generated by Artificial Intelligence*, VERGE (Mar. 14, 2018, 4:33 PM), <https://www.theverge.com/2018/3/14/17120588/deep-music-alexa-skill-ai-generated-music> [<https://perma.cc/P4VD-9Y5G>].

years after the death of Rembrandt van Rijn, the Dutch master painter, a team of art historians and technicians, using deep learning algorithms and facial recognition techniques, created *The Next Rembrandt*, a 3D printed painting in Rembrandt's style.²⁰⁸ The team, after studying the works of Rembrandt, decided to produce a portrait of a Caucasian male with facial hair, 30–40 years old, “wearing black clothes with a white collar and a hat, facing to the right.”²⁰⁹ Algorithms were trained on 346 of Rembrandt's paintings to learn patterns relating to his use of geometry, composition and painting materials, and then applied to produce a painting closely resembling a Rembrandt original.²¹⁰

Second, AI has altered humans' role in the creation of works. Since traditional works (e.g., photos) employ machines without human intelligence, such as cameras and computers, human creators dominate their creation. In some domains, AI systems have already matched, if not surpassed, human intelligence.²¹¹ Some have evolved to a degree where they can not only emulate a particular human author to generate works in their style, but also create new styles to generate works. For example, a team at the Art and Artificial Intelligence Lab at Rutgers University has created deep neural networks called Generative Adversarial Networks and Creative Adversarial Networks.²¹² Generative Adversarial Networks can be taught to generate paintings in a particular, existing style while Creative Adversarial Networks, a modification of Generative Adversarial Networks, go further to generate paintings outside of known artistic styles.²¹³ Observers cannot tell whether Creative Adversarial Network paintings have been generated by a human or AI system.²¹⁴

Technological advances in AI are changing the dynamics of the creation process by transforming human interactions with machines. Although human creators can set parameters to guide AI outputs, it is the AI systems that use neural networks to make independent decisions and generate the works in ways that are akin to human thought processes. For instance, Jukedeck, an AI-powered music composition software, uses “deep neural networks to understand

208. Chris Baraniuk, *Computer Paints 'New Rembrandt' After Old Works Analysis*, BBC (Apr. 6, 2016), <https://www.bbc.com/news/technology-35977315> [<https://perma.cc/33NX-TMSH>].

209. *Id.*

210. *The Next Rembrandt: Bringing the Old Master Back to Life*, DUTCH DIGIT. DESIGN, MEDIUM (Jan. 24, 2018), <https://medium.com/@DutchDigital/the-next-rembrandt-bringing-the-old-master-back-to-life-35dfb1653597> [<https://perma.cc/LYZ6-R8GY>].

211. Lance Whitney, *Are Computers Already Smarter than Humans?*, TIME (Sept. 29, 2017, 10:09 AM), <https://time.com/4960778/computers-smarter-than-humans> [<https://perma.cc/GZ7D-HC5F>] (explaining that, unlike humans, computers can perform critical tasks and functions 24/7 without needing to rest).

212. Sarah Cascone, *AI-Generated Art Now Looks More Convincingly Human than Work at Art Basel, Study Says*, ARTNET (July 11, 2017), <https://news.artnet.com/art-world/rutgers-artificial-intelligence-art-1019066> [<https://perma.cc/8A72-SC4C>].

213. *Id.*

214. *Id.*

music composition at a granular level.”²¹⁵ Jukedek users do not need to know musical theory or even how to write musical note. The AI system only requires them to input basic parameters, such as genre, instruments, tempo, mood, duration, and speed, which it then uses to write original musical tracks.²¹⁶ Human creators no longer dominate the creation process with many AI systems, like Jukedek, requiring limited or no human intervention to produce creative output.²¹⁷ Rather, AI-generated creations could even be the result of the collaboration between humans and AI systems. The output does not solely contain the expression of the human creator with the AI system using its own capacities to create and thereby contribute original expression to the resulting work.

Third, AI-generated works differ from traditional works in that AI systems, rather than humans, use their intelligence to fix the works in a tangible medium. U.S. copyright law, for example, requires a work to be fixed in a tangible medium of expression by or under the authority of the author.²¹⁸ This fixation of works in tangible media determines who has control over the form of the final work. The increasing autonomy of AI systems challenges the traditional copyrightability requirement that human creators only use machines as a tool to fix their works. As the AI systems can produce partially or fully unpredictable results, the causal link between the creativity of the human creator and the resulting work is weakened or even broken.²¹⁹ The developer of the AI system “created the possibility of a work but did not embody it in the tangible medium of expression[]” because he cannot fully know and control how the user will use the system and how the system makes decisions.²²⁰ Neither does the AI user fix the work because the AI system generates random and unpredictable output.²²¹ As such, it is the AI system, not the programmers or users as human creators, that may fix AI-generated works in a tangible medium of expression.²²²

For instance, an AI system may consume and analyze more data to evolve of its own accord, deviating from initial programmed rules and determining output over which the human creator cannot have full control. The expression contributed by the AI system making independent creative choices blends with the human creator’s expression such that the resulting work does not

215. *Jukedek*, TECHCRUNCH, <https://techcrunch.com/startup-battlefield/company/jukedek> [https://perma.cc/Z9Y5-387H].

216. Emma Featherstone, *Introducing the Next Generation of Music Makers*, GUARDIAN (Aug. 29, 2017, 2:00 AM), <https://www.theguardian.com/small-business-network/2017/aug/29/computer-write-music-jukedek-artificial-intelligence> [https://perma.cc/B5DQ-TK24].

217. Clark D. Asay, *Independent Creation in a World of AI*, 14 FIU L. REV. 201, 205–06 (2020).

218. 17 U.S.C. § 101 (2018).

219. Gervais, *supra* note 1, at 2070.

220. MARSHALL A. LEAFFER, UNDERSTANDING COPYRIGHT LAW § 3.07 (6th ed. 2014).

221. *Id.*

222. See Annemarie Bridy, *The Evolution of Authorship: Work Made by Code*, 39 COLUM. J.L. & ARTS 395, 397–98 (2016).

fully embody the original intellectual conception of the human creator. In such a case, it is difficult to assert that the AI system is an agent of fixation while authorship is solely attributed to the human creator.²²³

Based on these three considerations, I argue that a *sui generis* mechanism should be created to protect AI-generated works. But who should be the *sui generis* rights owner for an AI-generated work? The relevant AI system that made the primary input for the creation of the work? Or the AI developer who set the AI system in motion? The recent AI rulings have resoundingly refused to grant IP ownership status to AI systems. Concurring with these rulings, I suggest that only AI developers should be deemed owners of the *sui generis* rights on the basis of their contributions to the creation of AI works. In the case of the project *The Next Rembrandt*, it is obvious that the AI system made the primary contribution to the creation of the painting in Rembrandt's style. However, the *sui generis* rights in this painting should be vested in the developer to recognize its contribution in creating the AI system concerned.

3. Modelling *Sui Generis* Protection After Mask Works

Based upon the above justifications, I propose that legislators consider introducing a new *sui generis* protection of AI-generated works by integrating major requirements of the existing *sui generis* protection of mask works.

i. *Sui Generis Protection of Mask Works*

Most modern electronic products and machines contain semiconductor chips or integrated circuits.²²⁴ The chips are usually made of multiple layers of semiconducting, insulating, and conductive material formed by a process called etching and disposition using a series of masks made photolithographically.²²⁵ Substantial skill and investment is expended to develop innovative layout designs for smaller, more efficient integrated circuits with more functions.²²⁶ Although it only costs free riders a small portion of the original investment to copy the layout designs,²²⁷ traditional IP law affords inadequate protection to semiconductor chips,²²⁸ while patent law

223. See Robert C. Denicola, *Ex Machina: Copyright Protection for Computer-Generated Works*, 69 RUTGERS U. L. REV. 251, 269 (2016) ("Some of the resulting works may be considered only computer-assisted and hence copyrightable, while for others the contribution of the human user or programmer to the ultimate expression of the work may be too attenuated to represent the human authorship now considered necessary for copyright protection.").

224. Thomas Hoeren, *The Protection of Pioneer Innovations—Lessons Learnt from the Semiconductor Chip Industry and Its IP Law Framework*, 32 J. MARSHALL J. INFO. TECH. & PRIV. L. 151, 151–52 (2016).

225. See *id.* at 152–54.

226. Timothy T. Hsieh, *A Bridge Between Copyright and Patent Law: Towards a Modern-Day Reapplication of the Semiconductor Chip Protection Act*, 28 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 729, 740–44 (2018).

227. *Id.* at 745–46.

228. Leon Radomsky, *Sixteen Years After the Passage of the U.S. Semiconductor Chip Protection Act: Is International Protection Working?*, 15 BERKELEY TECH. L.J. 1049, 1053–55 (2000).

does not extend protection to mask works because they are usually not non-obvious.²²⁹ Further, mask works are considered utilitarian and therefore not subject to copyright protection.²³⁰ Trade secret law is also an impracticable means of protection against copying of semiconductor chips because they are vulnerable to reverse engineering, a defense to a misappropriation of trade secrets claim.²³¹

The threat of unfair chip copying in the mid-1980s and dissatisfaction with the protection offered by traditional IP law triggered the semiconductor industry's call for specific protection of semiconductor chips.²³² As a result of heavy lobbying by the semiconductor industry, in 1984 the United States was the first jurisdiction to enact a statute called the Semiconductor Chip Protection Act ("SCPA"), which provided a *sui generis* form of protection for integrated circuit design rights.²³³ Under the SCPA, the protected subject-matter is the "mask work fixed in a semiconductor chip product."²³⁴ Principles of copyright and patent law can be found in the *sui generis* protection.²³⁵ Like copyright, mask works must meet a statutory standard of originality: A mask work must be original.²³⁶ In order to obtain IP protection, the mask work must either be registered with the U.S. Copyright Office or "commercially exploited anywhere in the world, whichever occurs first."²³⁷

The reciprocal protection provisions under the SCPA catalyzed the development of specific protection for semiconductor topographies in other jurisdictions.²³⁸ In 1986, the Council of the European Community adopted Directive 87/54/EEC, requiring member states to "protect the topographies of semiconductor products" through national legislation.²³⁹ Similarly, the

229. Robert L. Risberg, Jr., Comment, *Five Years Without Infringement Litigation Under the Semiconductor Chip Protection Act: Unmasking the Specter of Chip Piracy in an Era of Diverse and Incompatible Process Technologies*, 1990 WIS. L. REV. 241, 251-52 ("While patent law can protect electronic circuitry or an improved process of manufacture, patents generally do not protect the particular topographical layouts created by chip designers. The level of creativity involved in such layout designs does not usually rise to the level required by the patent laws.").

230. Hsieh, *supra* note 226, at 746 ("The Copyright Office denied registration on the basis that the artistic features embodied on the IC designs were not conceptually separated from the IC's utilitarian aspects." (footnote omitted)).

231. Radomsky, *supra* note 228, at 1055.

232. *Id.* at 1051-52.

233. *Id.* at 1052, 1056.

234. Semiconductor Chip Protection Act of 1984, 17 U.S.C. § 902(a)(1) (2018).

235. Hoeren, *supra* note 224, at 179.

236. 17 U.S.C. § 902(b)(1).

237. *Id.* § 904(a).

238. Jay A. Erstling, *The Semiconductor Chip Protection Act and Its Impact on the International Protection of Chip Designs*, 15 RUTGERS COMPUT. & TECH. L.J. 303, 310, 321-22 (1989).

239. Council Directive 87/54/EEC, art. 2(1), 1986 O.J. (L 24/36) 2 (EC).

Agreement on Trade-Related Aspects of Intellectual Property Rights²⁴⁰ requires its member states to protect mask works.²⁴¹

ii. *Creating a New Sui Generis Right*

Based on the existing *sui generis* protection of mask works, I suggest that legislators introduce through legal reform a new *sui generis* mechanism designed to protect works generated by AI systems with contributions from the systems' developers. Vesting this new *sui generis* right in those AI developers, the mechanism would operate with the following five central legal standards (among some peripheral ones).

First, only AI-generated works that are original should be eligible for the protection of new *sui generis* right. Originality, according to the U.S. Supreme Court, requires "that . . . [a] work was independently created by [its] author . . . and . . . [has a] minimal degree of creativity."²⁴² The *sui generis* protection of mask works is based on these two originality requirements. It first requires that a mask work is the independent creation of the rights holder and was not copied from another source.²⁴³ The mask work must also have a minimum degree of creativity because it cannot "consist[] [solely] of designs that are staple, commonplace, or familiar in the semiconductor industry, or variations of such designs, combined in a way that, considered as a whole, is not original."²⁴⁴ An AI-generated work eligible for the new *sui generis* protection would have to satisfy the same two originality requirements. That is, it should be independently created by an AI system with contributions from the system's developer and possess a minimal degree of creativity.²⁴⁵

Second, a bundle of economic rights for traditional copyrighted works should be conferred upon the *sui generis* rights holders of AI-generated works. Pursuant to the SCPA, only three economic rights are protected for mask works: (1) the right of reproduction; (2) the right of distribution; and (3) the right to facilitate the exercise of the first two rights.²⁴⁶ However, this scope of

240. Agreement on Trade-Related Aspects of Intellectual Property Rights art. 13, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299 (1994) (amended by the 2005 Protocol Amending the TRIPS Agreement) [hereinafter TRIPS Agreement].

241. *Id.* art. 35–38.

242. *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345 (1991).

243. 17 U.S.C. § 902 (2018).

244. *Id.* § 902(b)(2).

245. Dornis, *supra* note 89, at 17 ("The assignment of genuine authorial copyrights may still be reserved for human-made creations. But this does not exclude alternative means of protection."). The concept of *sui generis* rights does not require human creation. *Id.* at 44–59.

246. 17 U.S.C. § 905 provides that:

The owner of a mask work provided protection under this chapter has the exclusive rights to do and to authorize any of the following: (1) to reproduce the mask work by optical, electronic, or any other means; (2) to import or distribute a semiconductor chip product in which the mask work is embodied; and (3) to induce

economic rights would be too narrow for the full range of AI-generated works, which includes literary, artistic, and musical works. Since the exploitation of these works is identical to that of traditional copyrighted works, the *sui generis* rights holders of AI-generated works should enjoy the broader range of economic rights provided for under section 106 of the U.S. Copyright Act, namely the right of reproduction,²⁴⁷ the right to prepare derivative works,²⁴⁸ the right of distribution,²⁴⁹ and the right of public performance.²⁵⁰

Third, moral rights should not be bestowed upon the *sui generis* rights holders of AI-generated works. The U.S. Copyright Act protects the moral rights of attribution and integrity so as to allow the authors of works of visual art to claim authorship²⁵¹ and to prevent such works from being modified in ways that are prejudicial to their reputation.²⁵² However, the SCPA does not provide for any moral rights for mask works. Treated as industrial copyrights, the *sui generis* rights for mask works were designed to protect economic interests accrued from the exploitation of these works.²⁵³ Similarly, the *sui generis* rights for AI-generated works should not protect moral rights. The creators of these works are mainly AI algorithms with no legal personality or reputation that moral rights are intended to protect. Instead, the *sui generis* rights should only protect economic rights, ensuring that rights holders can exploit AI-generated works in the marketplace for financial gain.

Fourth, protection of the new *sui generis* rights in AI-generated works should last for ten years only. For traditional works, the term of copyright

or knowingly to cause another person to do any of the acts described in paragraphs (1) and (2).

Id.

247. *Id.* § 106(1) (providing that a copyright owner has the right “to reproduce the copyrighted work in copies or phonorecords”).

248. *Id.* § 106(2) (providing that a copyright owner has the right “to prepare derivative works based upon the copyrighted work”).

249. *Id.* § 106(3) (providing that a copyright owner has the right “to distribute copies or phonorecords of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending”).

250. *Id.* § 106(4) (providing that, for copyrighted works, a copyright owner has the right “to perform [literary, musical, dramatic, and choreographic works, pantomimes, and motion pictures and other audiovisual works] publicly”); *id.* § 106(6) (providing that, for copyrighted works, a copyright owner has the right “to perform [sound recordings] publicly by means of a digital audio transmission”).

251. *Id.* § 106A(a)(1)(A)–(B).

252. *Id.* § 106A(a)(2)–(3).

253. *Copyright Protection for Semiconductor Chips: Hearing on H.R. 1028 Before the Subcomm. on Cts., C.L. & the Adm. of Just. of the H. Comm. on the Judiciary*, 98th Cong. 14 (1983) (statement of L. Ray Patterson, Professor of Law, Emory University School of Law) (“The conceptual basis for an industrial copyright should be purely and simply unfair competition based on the misappropriation rationale.”).

protection is the life of the author plus 70 years.²⁵⁴ The term of protection for a mask work is much shorter, lasting ten years from the date the mask work is registered with the U.S. Copyright Office or is first commercially exploited anywhere in the world.²⁵⁵ Similarly, the new law should protect the *sui generis* rights in AI-generated works for ten years only, starting from the date on which an AI-generated work is published.

Fifth, the new *sui generis* rights should guard only against verbatim copying of AI-generated works. For traditional copyrighted works, any unauthorized reproductions (fair use excluded) that bear a substantial similarity to them infringe copyright.²⁵⁶ With respect to AI-generated works, I suggest that verbatim similarity²⁵⁷ should be applied as a yardstick to determine whether an unauthorized reproduction would amount to infringement of the *sui generis* right. This standard reflects the fact that AI systems draw on big data to create works and that less legal protection is needed given that AI systems cannot be recognized as authors.

The combination of these major legal standards has the advantage of encouraging technology developers to create more advanced AI systems to generate works and at the same time protect the public interest in accessing and using those works. AI-generated works protected by the proposed *sui generis* mechanism enter the public domain much sooner, free for everyone to use after the expiration of a ten-year protection period. As the proposed *sui generis* mechanism applies the verbatim similarity standard for weighing copyright infringement allegations, it significantly reduces the likelihood of finding an infringement, thereby allowing the public to enjoy greater freedom to use AI-generated works.

To determine eligibility for protection under the proposed *sui generis* mechanism, AI-generated works must be distinguished from conventional works of authorship. But how can we identify works that are generated by AI systems? For now, this is straightforward because AI developers spontaneously announce this “AI-generated works” status to publicize the development of their AI systems. However, developers’ enthusiasm for revealing such status is very likely to wane when AI-generated works become commonplace. Also, were the proposed *sui generis* mechanism to be established and implemented, developers and users of AI systems would be reluctant to reveal that their works are generated by such systems since it would mean that these works receive a lesser degree of legal protection than conventional works of

254. 17 U.S.C. § 302(a) (“Copyright in a work created on or after January 1, 1978, subsists from its creation and, except as provided by the following subsections, endures for a term consisting of the life of the author and 70 years after the author’s death.”).

255. *Id.* § 904.

256. See Shyamkrishna Balganesh, *The Normativity of Copying in Copyright Law*, 62 DUKE L.J. 203, 206 (2012).

257. For a discussion about the verbatim similarity standard applied in copyright law, see LEAFFER, *supra* note 220, § 9.04(B)–(C).

authorship. Put differently, developers and users of AI systems may hide the “AI-generated works” status to entitle their works to the stronger legal protection that conventional works of authorship enjoy.²⁵⁸

I suggest, therefore, that the proposed *sui generis* mechanism should also create a verification obligation that requires AI system developers or users to publicize the generation of their works by such systems. Pursuant to this requirement, when publishing a work an AI developer should state on the work that it is generated by an AI system. Failure to meet this requirement would subject the AI developer to civil penalties such as a fine and a public apology. If the developer transfers ownership of *sui generis* rights to its users when selling AI systems to them, the verification obligation shift to these users. Therefore, the developer must inform the users of the verification obligation requiring them to reveal the “AI-generated works” status when they publish such works.

The proposed *sui generis* mechanism also overcomes problems with alternative approaches to protecting AI-generated works. As discussed in the preceding Part, certain scholars have suggested that AI-generated works may still be protected through the work-made-for-hire doctrine, imagining a similarity between AI creativity and work-made-for-hire scenarios.²⁵⁹ However, the analogy drawn between employer-employee and programmer-AI relationships is erroneous. Were the work-made-for-hire doctrine to be applied, an AI system would be wrongly deemed a human author. In deeming an AI work—intrinsically devoid of originality—created by a “human” author, the fundamental requirements of copyrightability, such as authorship and originality, would be unduly circumvented. Protected this way, the alleged authorship of an AI-generated work would have no human connection.²⁶⁰

Avoiding legal fiction, the proposed *sui generis* mechanism directly connects protectable works with AI system developers. While it still confers on AI system developers *sui generis* rights such as the right of reproduction, it grants much less legal protection to their AI works given their peripheral role in the creation of these works. The work-made-for-hire approach, however, does not differentiate AI-generated works from conventional works, applying the same copyright protection to AI-generated works without adjusting the scope of exclusive rights protection. Therefore, the proposed *sui generis*

258. See Samuelson, *supra* note 106, at 1208 (“[I]t will often be difficult if not impossible to discern whether a particular work was generated by a program at all—let alone by this particular program. As a result, enforceability problems would be particularly acute if rights are allocated to the programmer.”).

259. See *supra* notes 153–55 and accompanying text.

260. See Gervais, *supra* note 1, at 2094–95 (“Attributing rights in a machine-created work to a human (or other person) is arguably exactly the opposite: It gives a non-human creation to a human (or other) person If, in contrast, a machine owned by, say a film production company, produced scenes for a movie and no credible link to the creativity of a human (user or programmer) could be established, then the resulting production and its authorship would have no human connection.”).

mechanism has another advantage over the work-made-for-hire approach in allocating a proper degree of copyright protection to AI-generated works.

As shown in Part III, some scholars have advocated for protecting AI-generated works through related rights that are granted to persons or entities such as phonogram makers and broadcasting organizations.²⁶¹ The grant of related rights is conditioned upon the identification and protection of their underlying authorial works such as literary, artistic, and musical works. Copyright law protects related rights owing to their holders' efforts in disseminating authorial works to the public through acts such as making and distributing phonograms that embody lyrics and musical compositions. Therefore, without settling the copyrightability of an AI-generated work and identifying its copyright owner, it is simply implausible to apply the related rights mechanism to reward efforts in disseminating the AI-generated work.

The proposed *sui generis* mechanism obviates this impasse. By applying standards such as originality, the mechanism addresses whether an AI-generated work is copyrightable. It also identifies the AI system developer for the work as its copyright owner. With these legal issues settled, the proposed *sui generis* mechanism paves the way for protecting related rights for those who further disseminate the work to the public through sound or video recording or broadcasting. In so doing, it better facilitates dissemination of AI-generated works.

B. PLACING AUTONOMOUS AI CREATIONS IN THE PUBLIC DOMAIN

How should we deal with works created by autonomous AI systems in the absence of any human contributions? In this Section, I argue that a more socially beneficial solution is to place works created by autonomous AI in the public domain, without copyright or *sui generis* rights protection.

1. Autonomous AI Technologies

Autonomous AI can now be “produced independently and without direct human influence” through the process of machine learning.²⁶² While human involvement is necessary at the programming stage, “[d]uring the subsequent teaching and training phase . . . an ‘evolution’ occurs”, leading to changes in data optimization and algorithm architecture.²⁶³ Autonomous processes in AI systems are enabled by the integration of four fundamental capabilities: (1) sense (observe and orient); (2) decide; (3) act; and (4) communicate.²⁶⁴ An autonomous

261. Dornis, *supra* note 89, at 44 (arguing that the related “rights regime covers a wide range of subject matter that need not overcome the threshold of a ‘personal intellectual creation,’ namely phonograms and sound recordings, first fixations of films and broadcasts, and certain databases” (footnote omitted)).

262. *Id.* at 7.

263. *Id.* at 7–8. AI technologies provide the underlying capability for autonomous systems. While autonomy is enabled by AI, not all uses of AI are autonomous. For example, many AI capabilities are used to augment human decision-making, rather than replace it. *See id.*

264. *See* Knight, *supra* note 200.

AI system “must be able to independently sense and select among different courses of action” and then make decisions and “accomplish goals based on its knowledge and understanding.”²⁶⁵ Whereas automation cannot accommodate ambiguity or adjust to uncertainties, autonomy includes a decision-making component that leverages computational intelligence and learning algorithms to adapt to unanticipated and changing situations.²⁶⁶ The convergence of technological breakthroughs in AI and computing hardware, combined with the unprecedented availability of labelled data, has enabled real-time or near real-time analysis and decision-making by autonomous AI systems.

An AI system used to generate paintings provides a good example of how distant this human connection to the creative process can already be. This AI system works using two neural networks. The first is a generator into which the programmer feeds paintings, enabling the system to formulate rules to generate its own works.²⁶⁷ The second is a discriminator which looks at both the original and generated paintings to determine which are real.²⁶⁸ The process operates like a game, with the generator continually attempting to produce paintings the discriminator will be tricked into believing are real.²⁶⁹

2. The Case for the Public Domain

Although technology is advancing, there are currently no fully autonomous AI systems, since the existing AI systems still lack the ability to plan and take initiative.²⁷⁰ However, as we edge closer to truly autonomous creation, a discussion of reform is necessary. Without action, such works will fall into the public domain, and there are multiple perspectives on whether this would best serve the public interest.²⁷¹ Some commentators suggest that it is more appropriate to consider autonomous AI a tool that is used to create inventions conceived by humans.²⁷² These commentators would, therefore, not oppose listing a human as a copyright owner of an AI-generated work.²⁷³ This view is underpinned by the belief that AI has not reached the level of artificial general intelligence because AI systems are incapable of independent thought and creation.²⁷⁴ However, others have suggested that even if AI systems achieve

265. *Id.*

266. *Id.*

267. Sarah Ligon, *AI Can Create Art, but Can It Own Copyright in It, or Infringe?*, PRAC. GUIDANCE J. (Feb. 28, 2019), <https://www.lexisnexis.com/lexis-practical-guidance/the-journal/b/pa/posts/ai-can-create-art-but-can-it-own-copyright-in-it-or-infringe> [<https://perma.cc/32QA-CY76>].

268. *Id.*

269. *Id.*

270. See de Cock Buning, *supra* note 129, at 518.

271. *Id.* at 533.

272. *Id.*

273. Hanson & Jung, *supra* note 87.

274. *Id.*; see EUROPEAN PARLIAMENT COMM. ON LEGAL AFFS., *supra* note 121, at 13 (describing the prospect of a self-conscious AI as “very futuristic”).

artificial general intelligence, identifying these systems as copyright owners would be pointless because the grant of copyrights provides no incentive to an automated system to create inventions and works.²⁷⁵

I argue that works generated by autonomous AI systems should be placed in the public domain without any international IP protection. An unofficial Twitter poll run by Creative Commons revealed that most respondents (68.6 percent) already believe AI creations belong to the public domain.²⁷⁶ Although the survey did not require respondents to share their thoughts on this issue, in my opinion there are three major factors supporting this position.

First, drawing on the lessons from the recent AI rulings, autonomous AI systems should not be recognized as owners of IP rights because they lack human agency. The recent AI rulings confirm unequivocally that only natural persons can be rights owners. The USPTO rejected patent applications naming the allegedly *autonomous* AI system DABUS as inventor on the grounds that an AI system cannot be an inventor on a patent.²⁷⁷ Both the EPO and the UK High Court made the same decisions on the DABUS patent applications.²⁷⁸ Although the Chinese courts ruled that the AI-generated creations concerned were copyrightable, they decided that copyrights in these creations should be vested in natural persons instead of the relevant AI systems.²⁷⁹

Second, the recent AI rulings' denial of human agency to AI also indicates that autonomous AI systems do not need IP protection to sustain their creation of works, inventions, trademarks, and industrial designs. The ultimate question is whether the public domain approach would promote the greatest proliferation of intelligent creations, or whether the incentive of protection is necessary to ensure their continued production. It is obvious that autonomous AI systems do not require the incentivization provided by IP protection.²⁸⁰ Copyright, to a certain extent, incentivizes humans to create and disseminate works. However, autonomous AI systems would not need such incentives in the absence of human involvement. Furthermore, should AI authorship be allowed, programmers would be further incentivized to develop such systems, resulting in an upsurge of AI creations and a saturation

275. See Jozefien Vanherpe, *AI and IP: A Tale of Two Acronyms*, in *ARTIFICIAL INTELLIGENCE AND THE LAW* 207, 222–25 (Jan De Bruyne & Cedric Vanleenhove eds., 2021).

276. Brigitte Vézina & Brent Moran, *Artificial Intelligence and Creativity: Why We're Against Copyright Protection for AI-Generated Output*, CREATIVE COMMONS (Aug. 10, 2020), <https://creativecommons.org/2020/08/10/no-copyright-protection-for-ai-generated-output> [<https://perma.cc/ABL9-NNCP>].

277. See *supra* Section II.C.

278. See *supra* Section II.B.2.

279. See *supra* Section II.A.

280. Dan L. Burk, *Thirty-Six Views of Copyright Authorship*, by Jackson Pollock, 58 *HOUS. L. REV.* 263, 324 (2020) (“Leaving creations ‘where they lie’ in authorship doctrines means that in some cases there will be no author, and the creation will simply fall into the public domain. In general, this will be the right result where there is no need for a legal incentive, or the incentive is gratuitous.”).

of creative works in the market.²⁸¹ This could have limiting effects on the freedom of human creation, as it might become harder to meet the requisite standard of originality. The new AI creations would also be at greater risk of infringing existing works.²⁸² Therefore, the granting of IP rights to autonomous AI systems would inevitably result in a greater proliferation of such works, with the same potential for damaging effects on human creators.²⁸³

Third, placing creations generated by autonomous AI systems in the public domain would promote the public interest. Making such AI creations freely accessible maximizes supply and guarantees minimum prices for users of AI creations. With open access, materials can enrich public knowledge and drive innovation and creativity without relying on IP protection.²⁸⁴

V. CONCLUSION

AI technologies can produce novel breakthroughs that improve the quality of human life and will usher in the Fourth Industrial Revolution.²⁸⁵ However, concerns about the potential adverse effects of AI are mounting. Against this backdrop, IP protection in the era of AI must be shaped in ways that are beneficial to humanity. The recent AI rulings, as this Article has discussed, strive to ensure equal access to AI-generated creations through existing IP standards such as inventorship and authorship. The rulings warn against an overly broad application of IP standards that would recognize AI systems as copyright owners, but open the door to allowing AI developers to possess proprietary control of AI works.

Drawing on the recent AI rulings, this Article has proposed a two-tiered legal mechanism to protect AI-generated creations internationally. This future-looking proposal gives the necessary credit to human creativity in developing AI systems that can generate works beneficial to humanity. Meanwhile, it places the creations of autonomous AI systems in the public domain, thereby minimizing the negative effects of AI on the growth and enjoyment of public knowledge for all.

281. See *supra* Section II.A.

282. See *supra* Section II.A.

283. See *supra* Section II.A.

284. See JAMES BOYLE, *THE PUBLIC DOMAIN: ENCLOSING THE COMMONS OF THE MIND*, at xv–xvi (2008); Mauritz Kop, *AI & Intellectual Property: Towards an Articulated Public Domain*, 28 *TEX. INTELL. PROP. L.J.* 297, 324 (2020).

285. *The Fourth Revolution*, UNESCO, <https://en.unesco.org/courier/2018-3/fourth-revolution> [<https://perma.cc/L2JJ-XF8G>] (“After the internet and mobile internet triggered the Third Industrial Revolution, artificial intelligence (AI) technologies, driven by big data, are fuelling a Fourth Industrial Revolution.”).