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Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era--The Human-like Authors are Already Here- A New Model

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GENERATING REMBRANDT: ARTIFICIAL INTELLIGENCE, COPYRIGHT, AND ACCOUNTABILITY IN THE 3A ERA—THE HUMAN-LIKE AUTHORS ARE ALREADY HERE—A NEW MODEL

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ABSTRACT

Artificial intelligence (AI) systems are creative, unpredictable, independent, autonomous, rational, evolving, capable of data collection, communicative, efficient, accurate, and have free choice among alternatives. Similar to humans, AI systems can autonomously create and generate creative works. The use of AI systems in the production of works, either for personal or

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manufacturing purposes, has become common in the 3A era of automated, autonomous, and advanced technology. Despite this progress, there is a deep and common concern in modern society that AI technology will become uncontrollable. There is therefore a call for social and legal tools for controlling AI systems' functions and outcomes.

This Article addresses the questions of the copyrightability of artworks generated by AI systems: ownership and accountability. The Article debates who should enjoy the benefits of copyright protection and who should be responsible for the infringement of rights and damages caused by AI systems that independently produce creative works. Subsequently, this Article presents the AI Multi-Player paradigm, arguing against the imposition of these rights and responsibilities on the AI systems themselves or on the different stakeholders, mainly the programmers who develop such systems.

Most importantly, this Article proposes the adoption of a new model of accountability for works generated by AI systems: the AI Work Made for Hire (WMFH) model, which views the AI system as a creative employee or independent contractor of the user. Under this proposed model, ownership, control, and responsibility would be imposed on the humans or legal entities that use AI systems and enjoy its benefits. This model accurately reflects the human-like features of AI systems; it is justified by the theories behind copyright protection; and it serves as a practical solution to assuage the fears behind AI systems. In addition, this model unveils the powers behind the operation of AI systems; hence, it efficiently imposes accountability on clearly identifiable persons or legal entities. Since AI systems are copyrightable algorithms, this Article reflects on the accountability for AI systems in other legal regimes, such as tort or criminal law and in various industries using these systems.

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INTRODUCTION

The artist appraises the work, silently judging each stroke of dark ink on the canvas. Determining that the composition is not shaded quite right, the artist decides to switch to an even blacker hue.

Retrieving the brush from the palette, the artist begins to work again, methodically filling the canvas with terse, precise brushstrokes. This is a familiar scene, one that has been playing out in artists' workshops from the medieval classic painters to modern creative artists. This artist, however, is different. It is a robot. Named e-David by its creators at the University of Konstanz in Germany, this robotic artist uses a complex visual optimization algorithm to create paintings.[1] E-David represents merely one step in the ongoing development of the complex, advanced, automated, autonomous, unpredictable, and evolving artificial intelligence (AI) systems that already create original intellectual property works.[2]

These AI systems are quite different from simple laser printers, which can only reproduce or copy existing works, in a predictable, structural method. E-David, on the other hand, unlike the traditional systems, can produce new drawings in a non-anticipated and creative way.[3] E-David does not copy other works, but instead autonomously takes pictures with its camera and draws original paintings from these photographs. Some of these artworks might be entitled to

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1. *See* Oliver Deussen et al., *Feedback-Guide Stroke Placement for a Painting Machine*, *in* PROC. EIGHTH ANN. SYMP. ON COMPUTATIONAL AESTHETICS IN GRAPHICS, VISUALIZATION & IMAGING 25, 25, 27 (2012) (describing the e-David painting machine, designed to simulate human painting processes, and the methods used by the developers in the Department of Computer and Information Science at the University of Konstanz, Germany). E-David has an arm, five brushes, a camera, a system of optimization via visual feedback, and a system of optimization strategy. *See id.*; *see also* Jason Falconer, *e-David the Robot Painter Excels in Numerous Styles*, NEW ATLAS (July 17, 2013), http://newatlas.com/edavid-robot-artist-painter/28310/ [http://perma.cc/R6DR-44EM] (arguing that "[t]he line between art and technology isn't just being blurred, it's being erased altogether").

2. Falconer, *supra* note 1 (describing the artworks of e-David as composed of sketches from existing pictures as well as new ones taken with a camera). Relying on existing works might be considered an infringement of the copyright of the original works either directly or as creating derivative works. However, more sophisticated AI systems can create new artworks without copying or infringing copyrights of others. These systems are the focus of this Article. *See, e.g.*, Harold Cohen, *Driving the Creative Machine*, ORCAS CTR., CROSSROADS LECTURE SERIES, 1, 3, 5, 7 (Sept. 2010), www.aaronshome.com/aaron/aaron/publications/orcastalk2s.pdf [https://perma.cc/5ATB-ALJP] (describing the AARON machine, which is another machine that creates abstract artworks); *see also* Harold Cohen, *Fingerpainting for the 21st Century*, AARONS HOME (Feb. 8, 2016), aaronshome.com/aaron/aaron/publications/8Feb2016Fingerpainting-for-the-21st-Century-with-Figures.pdf [https://perma.cc/A2J4-PVSK] (explaining the techniques and the process of developing the system).

3. *See* Falconer, *supra* note 1.

copyright protection had humans created them. By using different techniques and an optimization system, e-David makes autonomous and unpredictable decisions about the image it is creating, the shapes and colors, the best way to combine light and shadow, and more.[4] Even though e-David functions through software created by its programmers, a camera embedded in its complex system allows it to independently take new pictures and generate new creative input as "its own."

In this Article, I argue that under the "3A era" of automated, autonomous, and advanced technology, sophisticated AI systems and robots turn into talented authors. Indeed, these AI systems already function in the 3A era, generate products and services, make decisions, act, and independently create artworks.

In 2016, nearly 400 years after the death of Rembrandt Harmenszoon van Rijn, the famous Dutch painter, a new Rembrandt, or rather The Next Rembrandt, was unveiled to the world.[5] The goal of the project was to digitize the painting method of Rembrandt, the human painter.[6] Once the program "learned" the style of the painter, it would create a new, creative, independent, and original work of art of the genuine Rembrandt.[7] To ensure its success, the project brought together experts from a variety of fields—engineering, history, art—

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4. *Id*. (describing how the software chooses what paint color and brush strokes are needed and how it can make up for inaccuracies in brush strokes and unpredictable paint mixing that occurs on the canvas).

5. Steve Schlackman, *The Next Rembrandt: Who Holds the Copyright in Computer Generated Art*, ART L.J. (Apr. 22, 2016), http://artlawjournal.com/the-next-rembrandt-who-holds-the-copyright-in-computer-generated-art [https://perma.cc/2C2R-EB5N] (discussing how the first "goal of the project was to discover if an algorithm could . . . produce a physical work of art that would mimic the look of a genuine Rembrandt painting").

6. *Id.*

7. *Id.*; *see also The Next Rembrandt*, YOUTUBE (Apr. 5, 2016), https://www.youtube.com/watch?v=IuygOYZ1Ngo&t=3s [https://perma.cc/L4PR-NZNC].

> To accomplish this lofty task, the team began with an in-depth study of the proportions and features of the faces in Rembrandt's works. To master his style, the project team "designed a software system that could understand Rembrandt based on his use of geometry, composition, and painting materials. A facial recognition algorithm identified and classified the most typical geometric patterns used by Rembrandt to paint human features. It then used the learned principles to replicate the style and generate new facial features for our painting."

Schlackman, *supra* note 5.

and transferred their knowledge into software capable of creating entirely new works of art.[8]

Once a work such as the new Rembrandt painting is created by an AI system, however, policy makers must re-consider the relevancy of the current laws. Can our legal system cope with questions of ownership and responsibility in the 3A era that have never been seen before?[9] This discussion has deep roots in the copyright regime because AI systems are, ultimately, software algorithms that are regulated under the existing copyright law regime.[10] I argue that one of the main challenges in the near future, the accountability of AI systems, may be solved through the use of copyright lens.[11]

AI systems and machine learning have already become part of our everyday life. One can already identify AI systems in unexpected regimes, such as: AI doctors,[12] AI therapists,[13] independent driverless

8. *See The Next Rembrandt*, *supra* note 7.

9. HANOCH DAGAN, PROPERTY: VALUES AND INSTITUTIONS 3-35 (2011) (describing how the ownership of property rights means not only excluding others but also having accountability toward others regarding the right over the property and the use of the property); *see also* HANOCH DAGAN, RECONSTRUCTING AMERICAN LEGAL REALISM & RETHINKING PRIVATE LAW THEORY 104-28, 161-92 (2013) (disagreeing with the prevailing approach of private law in general and interprets the private law as reflecting horizontal relationships among citizens); Hanoch Dagan, *The Challenges of Private Law: A Research Agenda for an Autonomy-Based Private Law*, *in* PRIVATE LAW IN THE 21ST CENTURY 67-87 (Kit Barker, Karen Fairweather & Ross Grantham eds., 2017) (advocating for private law as necessary to govern interpersonal relationships).

10. *See Copyright Ownership: Who Owns What?*, STAN. U. LIBR., https://fairuse.stanford.edu/overview/faqs/copyright-ownership/ [https://perma.cc/4Y6E-ASJK] (last visited Jan. 15, 2018).

11. *See, e.g.*, Rebecca Crootof, *War Torts: Accountability for Autonomous Weapons*, 164 U. PA. L. REV. 1347, 1366, 1375-86 (2016) (arguing that because autonomous weapons can independently and unpredictably select and engage targets—causing mass killings and damage—and because there is no individual to blame for reckless behavior, a new legal regime of tort laws should arise in the absence of other existing international tools); *see also* GABRIEL HALLEVY, WHEN ROBOTS KILL: ARTIFICIAL INTELLIGENCE UNDER CRIMINAL LAW 1-4 (2013) (discussing the accountability of robots for criminal offenses).

12. Jolene Creighton, *AI Saves Woman's Life by Identifying Her Disease When Other Methods (Human) Failed*, FUTURISM (Aug. 5, 2016), http://futurism.com/ai-saves-womans-life-by-identifying-her-disease-when-other-methods-humans-failed [https://perma.cc/8SWR-U9TD] ("If you needed proof that the age of artificial intelligence is officially upon us, well, look no farther. Reports assert [] that IBM's artificial intelligence (AI) system, Watson, just saved the life of a Japanese woman by correctly identifying her disease. This is notable because, for

cars,[14] AI lawyers,[15] automated Alternative Dispute Resolution,[16] and automated contracts.[17] AI systems have also significantly influenced many other fields, such as investments,[18] automated weapons,[19]

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some time, her illness went undetected using conventional methods, and doctors were stumped.").

13. *See* Jonathan Amos, *Love Lab Predicts Marital Outcome*, BBC NEWS (Feb. 13, 2004, 9:20 AM), http://news.bbc.co.uk/2/hi/science/nature/3484981.stm [https://perma.cc/ZFU7-Y69K] (discussing a mathematical model scientists believe can tell which marriages are doomed to end in divorce).

14. *See* David Szondy, *University of Oxford Develops Low-Cost Self Driving Car System*, NEW ATLAS (Feb. 18, 2013), http://newatlas.com/oxford-robot-car/26282 [https://perma.cc/BU7S-6RGY]; *see also* Alexandru Budisteanu, *Using Artificial Intelligence to Create a Low Cost Self-driving Car*, BUDISTEANU, http://budisteanu.net/Download/ISEF%202%20Autonomous%20car%20Doc%20particle.pdf [https://perma.cc/Y46J-KSSA] (last visited Jan. 15, 2018) (discussing how a car that should be able to drive automatically and autonomously in an urban area is achievable). In 2004 road traffic caused 2.5 million deaths worldwide and 50 million injuries—87% of crashes were due solely to driver factors. *Id.* Most of the project's components of self-driving cars have been done; the system is able to recognize the traffic signs and register them in a common database using Google maps, GPS, and more. *Id.*

15. *See, e.g.*, Jessica Chasmar, *Stanford Student's Robot Lawyer Has Beaten 160,000 Parking Tickets*, WASH. TIMES (June 29, 2016), http://www.washingtontimes.com/news/2016/jun/29/joshua-browder-stanford-students-robot-lawyer-has-/ [https://perma.cc/X9CE-VESH] (describing a lawyer bot that won 160,000 cases); *This Robot Lawyer Could Help You Get Your Parking Ticket Dismissed*, CBS NEWS (July 21, 2016, 7:05 AM), http://www.cbsnews.com/news/donotpay-bot-lawyer-helps-dismiss-parking-tickets-joshua-browder [https://perma.cc/7REW-JWHC] (describing Stanford University freshman Joshua Browder and how the robot already saved drivers an estimated $4-5 million).

16. Chasmar, *supra* note 15.

17. Lauren Henry Scholz, *Algorithmic Contracts*, 20 STAN. TECH L. REV. 128, 133 (2017) (arguing that "[t]he existence of algorithms that must be understood as servants rather than mere tools justifies the creation and analysis of a distinct category called 'algorithmic contracts,'" and that "[m]achine learning enables sophisticated algorithms to be more similar in function to a human employee with a task to achieve than a tool").

18. Nizan Geslevich Packin & Yafit Lexv-Aretz, *Big Data and Social Netbanks: Are You Ready To Replace Your Bank?*, 53 HOUS. L. REV. 1211, 1222 (2016) (showing that most financial institutes in North America are using big data analyses and banks are moving toward adopting technologies tools).

19. Rebecca Crootof, *The Killer Robots Are Here: Legal and Policy Implications*, 36 CARDOZO L. REV. 1837, 1840-43, 1863-71, 1894-1901 (2015) (arguing that AI weapons "systems with varying levels of autonomy . . . have already integrated into the armed forces of numerous states" and calling for defining Autonomous Weapon System and regulating them internationally); *see also* Roberto Baldwin, *The Robots of War: AI and the Future of Combat*, ENGADGET (Aug. 18, 2016), https://www.engadget.com/2016/08/18/robots-of-war-ai-and-the-future-of-combat [https://perma.cc/NPZ2-66VV] (arguing that "[t]he future of warfare will be

espionage,[20] and even social policymaking.[21] It is hard to imagine an area of study that has not been influenced by AI systems.

The AI industry has rapidly and consistently become an inevitable part of our present, and it is expected to further develop as the industry is estimated to grow to $70 billion by 2020.[22] Although these systems are set to add substantial value to our world and bring about positive change, there are several drawbacks to these advanced

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filled with AI and robots [and] it'll be a world where whoever builds the best artificial intelligent will emerge the victor"); Caitlin Brock, *Where We're Going, We Don't Need Drivers: The Legal Issues and Liability Implications of Automated Vehicle Technology*, 83 UMKC L. REV. 769, 770-73, 787-88 (2015) (arguing that the future of no driver reality is coming and the time to prepare is now); Ray Kurzweil, *The Virtual Thomas Edison*, TIME (Dec. 4, 2000), http://content.time.com/time/magazine/article/0,9171,90538-2,00.html [https://perma.cc/NK3R-29E8] (discussing issues raised by automated machines and the future of robots).

20. Jasper Hamill, *Eyes in The Sky: CIA Training Artificial Intelligence to Spy on Earth from Space Using Computer Vision*, THE SUN (Aug. 25, 2016, 5:19 PM), https://www.thesun.co.uk/news/1673802/cia-training-artificial-intelligence-to-spy-on-earth-from-space-using-computer-vision [https://perma.cc/4Q67-4AWW].

21. Rob Kling, *Automated Information Systems as Social Resources in Policy Making*, ACM 666, 666 (1978), http://dl.acm.org/citation.cfm?id=810109 [https://perma.cc/C8HL-PTBS]. Automated information systems have been suggested by a number of theorists to aid public policy makers in acquiring more accurate, timely, and relevant information.

> This paper reports a study of the uses and impacts of automated systems for policy analysis in 42 municipal governments. Automated analyses are commonly used in municipal governments . . . and are used to support policy suggestions which are often implemented. Automated systems in these settings serve in both educational and political roles.

See id. *But see* Jack M. Balkin, *The Three Laws of Robotics in the Age of Big Data*, 78 OHIO ST. L.J. (forthcoming 2017) (manuscript at 18-27) (arguing that a characteristic feature of the Algorithmic Society is that new technologies permit both public and private organizations to govern large populations. Behind robots, artificial intelligence agents, and algorithms are governments and businesses organized and staffed by human beings that exercise power over other human beings mediated through new technologies; therefore it is important to keep three rules: good faith; private owners' fiduciary to the public; and transparency).

22. *See Tech CEOs Declare This the Era of Artificial Intelligence*, FORTUNE (June 3, 2016), http://fortune.com/2016/06/03/tech-ceos-artificial-intelligence [https://perma.cc/K5KK-69C4] (discussing how "[t]ech companies are diving into AI analytics research, an industry that will grow to $70 billion by 2020 from just $8.2 billion in 2013" and that "[a]rtificial intelligence and machine learning will create computers so sophisticated and godlike that humans will need to implant 'neural laces' in their brains to keep up").

systems. Some of these drawbacks include, among other hazards, damage, suffering, and, most significantly, the loss of control. The main legal challenge remains: Who owns the products generated by AI systems and who is responsible for the possibly negative outcomes stemming from them?

Although diverse solutions have been proposed for dealing with the important issue of accountability for the works generated by autonomous AI systems, no one has yet seriously considered the solutions hidden within the paradigms embedded in the law of copyright. This Article proposes a new solution for dealing with the primary struggle regarding accountability of AI systems based on the copyright regime. The Article will address the fundamental intersection of AI systems and intellectual property laws. The Article proposes a solution taken from the copyright domain, one that might further influence the discussion of accountability for other products, such as autonomous cars and weapons, the drug industry, communication, and more. This relationship and the proposed solution (the new Model) have not been extensively discussed in the current literature. In an attempt to fill this gap in the literature, this Article will focus solely on the copyright regime.

Are creative systems such as e-David and The Next Rembrandt a unique phenomenon within the copyright arena? Not at all. Interestingly, the AI industry has not skipped the creative and innovative production of intellectual property and especially copyrightable works. Paintings generated by AI systems are displayed in exhibitions worldwide.[23] A scene in *Ex-Machina*, an independent thriller illustrating the power of AI, raises important questions of copyright law. In the movie, Ava, a humanoid robot, gives Caleb a drawing she has created for him as a gift to gain his love and his trust.[24] Ava's creative work was not a reproduction; it was an original piece of art that meets all the criteria for copyright protection, with the exception that it was created by an AI system.[25]

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23. See for example the exhibition of Trevor Paglen, A Study of Invisible Images (Sept. 8–Oct. 21, 2017 at Metro Picture, Gallery, NYC, USA), http://www.metropictures.com/exhibitions/trevor-paglen4/ [https://perma.cc/3NCW-B96F] (showing the spectacular exhibition of paintings made by one AI system—the Generator/the painter—with the sophisticated feedback of another AI system—the Discriminator/the trainer—after exchanging millions of examples between these two AI systems. This technique named Generative Adversarial Networks (GANs) uses AI algorithms by implementing two neural networks used in unsupervised machine learning contesting each other).

24. EX MACHINA (Universal Pictures International 2015).

25. *Id*.

However, copyright works created by AI systems are no longer just the stuff of science fiction movies.[26] Automated machines, or AI-like systems, are already producing original works in almost every copyrightable medium, such as music,[27] poetry,[28] literature,[29] news,[30] and many others.[31] Indeed, today it is almost impossible to imagine any kind of art developed without using at least some digital means. Eventually, automated systems will replace both creators and producers of numerous types of works, products, and services.

Following these latest developments, the legal challenge in the 3A era is to decide who owns the copyright once an automated, autonomous, and advanced machine, or any form of AI system, generates original and creative works independently of the humans who created the AI system itself.[32] Subsequently, it is unclear who is entitled to the licensing rights to the product, who is entitled to the

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26. Brad Merrill, *It's Happening: Robots May Be the Creative Artists of the Future*, MAKE USE OF (Dec. 17, 2014), http://www.makeuseof.com/tag/happening-robots-may-creative-artists-future/ [https://perma.cc/8AY7-NPDA].

27. William T. Ralston, *Copyright in Computer-Composed Music: HAL Meets Handel*, 52 J. COPYRIGHT SOC'Y U.S.A. 281, 306 (2005) ("The question of whether machine-generated expression is a proper subject for copyright has been, and probably will continue to be, a subject of continued debate.").

28. Samuel Gibbs, *Google AI Project Writes Poetry Which Could Make Vogon Proud*, THE GUARDIAN (May 17, 2016, 7:01 AM), https://www.theguardian.com/technology/2016/may/17/googles-ai-write-poetry-stark-dramatic-vogons [https://perma.cc/9938-ZASR] (discussing how Google, Stanford University, and others are working on an artificial intelligent program that will write poems after exposing the program to novels).

29. Alison Flood, *Computer Programmed to Write Its Own Fables*, THE GUARDIAN (Aug. 6, 2014, 4:09 AM), http://www.theguardian.com/books/2014/aug/06/computer-programmed-to-write-fables-moral-storytelling-system [https://perma.cc/6FAC-RL9A] (discussing how a computer can write new and creative stories).

30. For more examples, see Lin Weeks, *Media Law and Copyright Implications of Automated Journalism*, 4 N.Y.U. J. INTELL. PROP. & ENT. L. 67, 87 (2014) (bringing examples of news created by machines and leave the questions regarding copyright issues open); Steve Lohr, *In Case You Wondered, a Real Human Wrote This Column*, N.Y. TIMES (Sept. 10, 2011), http://www.nytimes.com/2011/09/11/business/computer-generated-articles-are-gaining-traction.html [https://perma.cc/5SWH-M4RC].

31. Peter Kugel, *Artificial Intelligence and Visual Art*, 14 LEONARDO 137, 137-39 (1981).

32. *See* Shlomit Yanisky-Ravid & Luis Antonio Velez-Hernandez, *Copyrightability of Artworks Produced by Creative Robots, Driven by Artificial Intelligence Systems and the Originality Requirement: The Formality-Objective Model*, 19 MINN. J.L. SCI. & TECH. 1, 7-8 (arguing that robots that create unique artworks challenge the concept of originality within copyright law and recommending the adoption of a more formal and objective approach).

royalties, and who bears responsibility for copyright infringement and protecting rights from infringements by others (humans or otherwise).[33] Another challenge entails figuring out who is entitled to the moral right,[34] if anyone should be at all.[35] Should this one role-player take it all or are many different stakeholders targeted?

Take, for example, The Next Rembrandt project. Approximately 350 paintings were analyzed and over 150 gigabytes of digitally rendered graphics were collected to provide the proper instruction set to produce the textures and layers necessary for The Next Rembrandt to have the painterly presence of an original work by the old master.[36] Given the hard work involved, the number of people required, and the large monetary investment, one must wonder who bears the responsibility and accountability for these *new* works generated by the AI system? Assuming the owner of the works (which differs from the owner of the AI system) is the most efficient entity to impose accountability on, who should be considered the owner?[37] And which legal rights could he or she assert?[38]

This development re-imagines the whole concept of art and artists, and as such, it has resulted in the need to re-create the legal regime that governs art, especially artworks produced by AI systems.[39] Intellectual property in general, and more specifically copyright laws, have become one of the most interesting, challenging, and contrasting fields demonstrating the unique features

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33. *See id.* at 6.

34. Xiyin Tang, *The Artist as Brand: Toward a Trademark Conception of Moral Rights*, 122 YALE L.J. 218, 224 (2012); *see generally* Shlomit Yanisky-Ravid, *Rethinking Employees' Intellectual Property Moral Rights: A New Model*, *in* INTELLECTUAL PROPERTY: INTERDISCIPLINARY PERSPECTIVE (Miriam Bitton & Lior Zemer eds., 2012).

35. *See* Yanisky-Ravid & Velez-Hernandez, *supra* note 32, at 6-7.

36. Schlackman, *supra* note 5. *See* Amanda Levendowski, How Copyright Law Creates Biased Artificial Intelligence 3 (Mar. 16, 2017) (unpublished manuscript) (on file with author) (arguing AI is biased because AI needs vast amounts of good data, which is protected by copyright laws that only wealthy entities can afford).

37. *See* sources cited *supra* note 9.

38. *See* Shlomit Yanisky-Ravid & Xiaoqiong (Jackie) Liu, *When Artificial Intelligence Produce Inventions: The 3A Era and an Alternative Model for Patent Law*, CARDOZO L. REV. (forthcoming 2018) (manuscript at 19-22) (arguing that the Multi-Players Model of AI systems places hurdles on entitling one human as the inventor in the case of AI systems produce inventions).

39. For more examples, see Yanisky-Ravid & Velez-Hernandez, *supra* note 32, at 13-14.

of advanced technology systems. AI systems can be characterized as creative, unpredictable, independent and autonomous, rational, evolving, capable of data collection and communication, efficient and accurate, and capable of exercising free choice among alternatives.[40] AI systems are also confronting the traditional concept of looking for the human author behind the creation because the AI systems themselves may "replace" humans.[41]

Traditionally, intellectual property laws, and in particular copyright laws, have been based on human creators, who creatively, originally, and independently create works.[42] But with the advent of AI systems, there is now the possibility that no human is behind the creative process. Instead, AI systems, as automated, autonomous, and advanced machines, create and produce works independently, unexpectedly, and creatively, with self-determination and an independent choice of what to create and how to create it. Even the wrong outcome, such as infringements of the rights of others or counterfeits, may be achieved independently, with no human to blame.[43] This raises the pressing issue of whether the human or the AI system should be entitled to ownership rights. This tension between art, creation, and AI systems is no longer a future concern or the topic of a science fiction movie, which is why it merits discussion.

This Article argues that the traditional laws of copyright are inadequate to cope with the new technology involved in creating artworks. I further argue that products and services independently generated by machines challenge the justifications under IP and copyright laws, which rely on humans to create the works. Copyright laws are simply ill-equipped to accommodate this tech revolution and are therefore unlikely to survive in their current form. In order to address the change in the way art is being created, we must either rethink these laws, give them new meaning, or be ready to replace them.

This Article proposes a few alternative scenarios of the new 3A era in which AI systems are capable of generating independent works. After discussing the drawbacks of these scenarios, I propose adopting a new model based on a broader version of the Work Made

40. *Id.* at 7 (describing the features of AI systems).

41. *Id.* at 7-8.

42. CRAIG JOYCE ET AL., COPYRIGHT LAW 3 (10th ed. 2016).

43. *See* Crootof, *supra* note 11, at 1349, 1376-81 (stating the same argument in regards to autonomous weapons).

for Hire (WMFH) doctrine.[44] I propose that AI systems should be seen as the creative employee or self-contractor creators working for or with the user—the firm, human, or other legal entity operating the AI system. On the one hand, this proposal reflects and maintains the human features of the AI system, such as independence, creativity, and intelligence. On the other hand, this proposal ensures that the employer or the user maintain the appropriate rights and duties, which include accountability for the outcomes of the AI system. This may be the best solution to the current problem of a lack of accountability for independent AI systems. Seeing the AI system through the copyright lens will provide new opportunities for imposing ownership and accountability on the known legal entities. Implementing a modified WMFH model may structure a feasible solution in the near future and impose responsibilities on the users who have affinities to the AI systems.

Part I of this Article will provide background on AI systems by discussing the different types of systems and their development over recent years. This Part will describe the features that make AI systems intelligent and creative and thus substitutes for human authors. Part II will address the question of who owns, and who takes the responsibility for, works created by AI systems. This Part presents two options. The first option is to see one of the humans or entities involved in the development of an AI system as the one who bears ownership and accountability for the outcomes of that system. The second option is to see the AI systems themselves as the digital, creative, and autonomous authors and hence the owners and the responsible entities for the works they produce. Part III will consider the various theoretical justifications for intellectual property protection. It will examine whether or not these theories lend any support or justification for these options or, alternatively, for a new option. Part IV will discuss the proposed model of AI systems, the WMFH model, and its implications for AI systems. Part V will discuss how U.S. copyright law is unprepared for the recent developments and challenges of AI systems, focusing primarily on the human authorship principle and extending copyright protection to works generated by automated creative AI systems. After determining that existing law is somewhat irrelevant and outdated, I propose that the AI WMFH model can cure not only the inapplicability of current copyright law to new and advanced AI systems, but can also cure the desire to control these systems as well

44. *See infra* Part III.

as to impose accountability on a legal known entity, such as the user of AI systems. By implementing the proposed model—one that sees AI systems as independent contractors or employees of the users and amending the law to accommodate the AI WMFH model—we can control the users of these systems, thus preventing situations in which the public loses control over the unknown outcomes of the AI systems.

I. WHAT ARE ARTIFICIAL INTELLIGENCE SYSTEMS? HISTORICAL AND TECHNICAL PERSPECTIVES

Before discussing the accountability of AI systems from a copyright perspective, one must address more basic questions: How does an AI system work? What does it mean that the system can autonomously create works? I argue that in order to address questions of accountability for AI systems, one must understand what lies beneath the mysterious concept of AI systems. This Part will clarify how automated AI systems function by focusing on one type of AI system that I have named the "pattern recognition" or "similarities identifier" AI system. This understanding is a fundamental step before further discussion takes place concerning the accountability of AI systems from a copyright perspective.

A. The Different Kinds of AI Systems: The Old vs. The New and Advanced

AI algorithms vary significantly.[45] A diverse array of AI algorithms has been developed to cover a wide variety of data and problems.[46] This diversity of learning architectures and algorithms

45. M.I. Jordan & T.M. Mitchell, *Machine Learning: Trends, Perspectives, and Prospects*, 349 SCI. MAG. 255, 255 (2015) (representing candidate programs, such as decision trees, mathematical functions, and general programming languages, and searching through these programs, such as optimization algorithms with well-understood convergence guarantees and evolutionary search methods that evaluate successive generations of randomly mutated programs).

46. *See generally* TREVOR HASTIE, ROBERT TIBSHIRANI & JEROME FRIEDMAN, THE ELEMENTS OF STATISTICAL LEARNING: DATA MINING, INFERENCE, AND PREDICTION (2d ed. 2009). *See generally* KEVIN P. MURPHY, MACHINE LEARNING: A PROBABILISTIC PERSPECTIVE (2012) (offering "a comprehensive and self-contained introduction to the field of machine learning, based on a unified, probabilistic approach" and stressing a principled, model-based approach often using language of graphical models to specify models in a concise and intuitive

reflects the diverse needs of applications capturing different kinds of mathematical structures and offering different levels of amenability to post-hoc visualization and explanation. It provides varying trade-offs between computational complexity, the amount of data, and performance.[47]

Defining AI systems is not an easy task. There are as many definitions as there are types of AI systems.[48] John McCarthy, who coined the term "Artificial Intelligence," did not provide an independent definition, while scholars Stuart Russell and Peter Norvig suggested almost ten different definitions.[49] Definitions generally vary according to the targeted subject, emphasizing different aspects of AI systems.[50] Based on its features, AI can be defined as a system capable of performing tasks that would normally require human intelligence, such as recognition, decision-making, creation, learning, evolving, and communicating.[51] AI can also be

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way); *Overview*, MIT PRESS, https://mitpress.mit.edu/books/machine-learning-0 [https://perma.cc/8K3F-BMCY] (last visited Jan. 15, 2018).

47. Jordan & Mitchell, *supra* note 45, at 257 (arguing that large-scale deep learning systems have had a major effect in recent years in computer vision and speech recognition).

48. Matthew U. Scherer, *Regulating Artificial Intelligent Systems: Risks, Challenges, Competencies, and Strategies*, 29 HARV. J.L. & TECH. 353, 360 (2016) (describing how, unfortunately, there does not yet appear to be any widely accepted definition of AI even among experts, whose definitions vary widely and focus on myriad of ways AI systems are interconnected with human function—the ability to learn, or consciousness and self-awareness—which are difficult to define).

49. STUART J. RUSSELL & PETER NORVIG, ARTIFICIAL INTELLIGENCE: A MODERN APPROACH 2-14, 1034 (3d ed. 2010) (describing definitions include thinking and acting humanly, as well as thinking and acting rationally; the definition is based on human features); *see also* Yanisky-Ravid & Liu, *supra* note 38, at 10-11 (listing different definitions of AI systems); *What Is Artificial Intelligence?*, JOHN MCCARTHY'S HOME PAGE (Nov. 12, 2007), http://www-formal.stanford.edu/jmc/whatisai/node1.html [https://perma.cc/4MF3-KJAH].

50. RUSSELL & NORVIG, *supra* note 49, at 5-12 (discussing different approaches to AI, such as philosophy, psychology, cognitive math).

51. *Id.* at 14; *see also* MARCUS HUTTER, UNIVERSAL ARTIFICIAL INTELLIGENCE: SEQUENTIAL DECISIONS BASED ON ALGORITHMIC PROBABILITY 125-26, 231 (W. Brauer, G. Rozenberg & A. Salomaa eds., 2005) (arguing that AI system is a form of intelligence, as a result of features like creativity, problem solving, pattern recognition, classification, learning, induction, deduction, building analogies, optimization, surviving in an environment, language processing, and knowledge). *Artificial Intelligence*, OXFORD DICTIONARY, https://en.oxforddictionaries.com/definition/artificial_intelligence (last visited Jan. 15, 2018) ("The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.").

described as an instrument that can make existing solutions more efficient by using all data that is reachable by the AI system. Various contexts, such as medical treatments or chess strategies, also lead to different definitions of AI systems.[52]

Until recently, the "artificial intelligence" field was dominated by quasi-AI systems called "expert systems," which mainly used a rules-based decision-making process.[53] Put more simply, these systems were not fully autonomous and, therefore, not truly "intelligent." They lacked the ability to learn and produce unpredictable results because they mostly acted in ways predetermined by their human-created programming.[54] These systems could not evolve through learning. Consequently, they could not be truly creative because they could only "know" information that a human had placed in their "knowledge base."[55] Policy makers, nevertheless, still see these systems as the model of advanced technology. In many machines that create artworks, even though the software has some discretion in how to create the final composition, the scope of that discretion is limited to the operation of programming created by the human inventors.[56] The significance of

52. *See* Yanisky-Ravid & Liu, *supra* note 38, at 9 (describing why AI systems are intelligent).

53. Dana S. Rao, *Neural Networks: Here, There, and Everywhere—An Examination of Available Intellectual Property Protection for Neural Networks in Europe and the United States*, 30 GEO. WASH. J. INT'L L. & ECON. 509, 509 (1997) (examining "whether U.S. patent law applies to software-implemented neural networks in light of recent decisions by the U.S. Court of Appeals for the Federal Circuit, [as well as] analyz[ing] whether software networks can receive patent protection in the EC, based on Trade Related Intellectual Property Side (TRIPS) agreements and the Berne Convention, EC directives, Member-State statutes, and Member-State case law").

54. Arthur R. Miller, *Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?*, 106 HARV. L. REV. 977, 1038-39 (1993) (addressing the claim that it will eventually be impossible to assimilate computer-generated works into the copyright system because they may have no obvious human author, and concluding not only that the case law contains no persuasive objection to extending copyright protection to these works, but also that such an extension would fulfill the constitutional imperative of promoting progress in these areas).

55. *Id.* (concluding that, despite arguments that incorporating new technologies into the current copyright system will lead to overprotection, the current regime is flexible enough to address concerns).

56. *See e-David. A Painting Process*, UNIVERSITÄT KONSTANZ (Apr. 24, 2017) https://cms.uni-konstanz.de/informatik/edavid/news [https://perma.cc/UX4T-XAAB] (describing the combination of human input and machine learning involved in the creation of the e-David painting robot).

this from the copyright perspective is that human input is still necessary, not only for a work to be produced, but for it to have any sort of creative content. An expert system has become a tool for human creativity.[57]

Even though this type of quasi-AI system still exists, it does not represent the new standard of today, which is the focus of this study. AI technology has advanced rapidly. After working for decades on creating a new type of AI system, computer researchers have recently succeeded in creating a system that can ultimately have serious ramifications for copyright law.[58] The current AI systems, functioning intelligently and using learning components autonomously, complicate the discussion. These systems are called "neural networks" because they mimic the function of human brains by absorbing and distributing their information processing capacity to groups of receptors that function like neurons; they find and create connections and similarities within the data they process.[59] Any one of these units, called "perceptrons," can "know" whether and how much to react given a particular input; taken together, the system of these responses governs the action of the whole machine.[60] The difference between a neural network and an expert system is that the former model allows the system to "learn" through trial and error.[61] Given a goal, the system can try random outputs until it successfully performs the desired action and then repeat that response the next time it gets the same or a similar input.[62] Consequently, a neural network could, like a human, "learn" how to paint, write, or compose and generate a work whose creative content is not the result of any human intervention. At first glance, the human inventor or programmer of such a machine seems to have no more claim to a copyright in such a work than an artist's mother has to her child's work, or than a camera manufacturer has to the photos taken by photographers, or than a piano manufacturer has to the melody being created by the musicians while using the instrument. After all,

57. Miller, *supra* note 54, at 980. "A congressional committee has held 'oversight' hearings on the subject but has taken no action." *Id.* at 980 n.7 (citing *Computers and Intellectual Property: Hearings Before the Subcomm. on Courts, Intellectual Prop., and the Admin. of Justice of the House Comm. on the Judiciary*, 101st Cong., 1st & 2d Sess. 1 (1989 & 1990)).

58. Rao, *supra* note 53, at 509.

59. *Id.* (discussing how the developments of neural networks, which allows a system to "learn" information while training, has recently rapidly expanded).

60. *Id.* at 511.

61. *Id.*

62. *Id.* at 509.

neither the inventor and programmer nor the mother nor the manufacturer contributed anything to the creative process except the artist him-, her-, or itself.

Following Scherer's evasive definition of an intelligent system—"machines that are capable of performing tasks that, if performed by a human, would be said to require intelligence"[63]—one may still ask, what makes the system so intelligent? In other words, how does the system really work?

B. How Do Artificial Intelligence Systems Actually Work?

The process of recognition involves the classification or identification of objects, persons, events, or situations. Research about the human brain promoted the development of one group of algorithms, AI (sometimes named by its learning capability—Machine Learning (ML)), capable of identifying objects or automatically classifying them in a similar way to what we believe and know about human perception and pattern recognition.[64] One way the AI system functions, among many others, is by following the process of human perception in a few stages.[65] First, the algorithm is presented with multiple examples and their correct classification (pictures of dogs, faces, signals from the body, or any other data that can be subject to patterns of similarities). Second, the algorithm breaks the data down into "tiny" electronic signals, undetectable by humans, and tries to identify hidden insights, similarities, patterns, and connections—without being explicitly programmed on where to look ("training").[66] Thus, the patterns and

63. Scherer, *supra* note 48, at 362-64 (arguing for a reform in tort law regulation to cover AI systems liability).

64. *See* Mauricio Orozco-Alzate & Germán Castellanos-Domínguez, *Nearest Feature Rules and Dissimilarity Representations for Face Recognition Problems*, *in* FACE RECOGNITION 337, 337-56 (Kresimir Delac & Mislav Grgic eds., 2007); *see also* Mauricio Orozco-Alzate & César Germán Castellanos-Domínguez, *Comparison of the Nearest Feature Classifiers for Face Recognition*, 17 MACHINE VISION & APPLICATIONS 279, 279 (2006) [hereinafter Orozco-Alzate & Castellanos-Domínguez, *Comparison of the Nearest Feature Classifiers*].

65. *See generally* Orozco-Alzate & Castellanos-Domínguez, *Comparison of the Nearest Feature Classifiers*, *supra* note 64.

66. Anders Krogh, *What Are Artificial Neural Networks?*, 26 NATURE BIOTECHNOLOGY 195, 195-97 (2008) (describing generally how AI systems work). *See generally* James J. DiCarlo, Davide Zoccolan & Nicole C. Rust, *How Does The Brain Solve Visual Object Recognition?*, 73 NEURON 415 (2012) (explaining that neuroscientists are providing new clues and constraints about the algorithmic solution). See in practice *Datasets For Machine Learning & Artificial Intelligence*

similarities that the algorithm finds (or creates) may not be clear or completely understood by the programmers, trainers, or those who actively functionalize the system. In fact, "[m]any developers of AI systems now recognize that, for many applications, it can be far easier to train a system by showing it examples of desired input-output behavior than to program it manually by anticipating the desired response for all possible inputs."[67] Astonishingly, the trainer can be human or another AI system.[68] Third, performance improves with experience and evolves with new data to which the system is exposed.[69] In other words, the system is constantly evolving as a result of new data it has either autonomously found or been inputted with by data providers. For example, if we would like the AI system to create music, we would expose it to many songs or rhythms from different clusters of music, and the AI system would find interconnections unfamiliar even to the programmer. The AI system would keep evolving when exposed to new music in the future and would eventually be able to create new original music independently and without copying other works.[70] A similar process would take place for writing new stories, painting, creating dances, programing design, programming software, detecting signals in roads, producing new drugs, and even designing AI systems.[71]

(AI) Training, CLICKWORKER, https://www.clickworker.com/machine-learning-ai-artificial-intelligence/ [https://perma.cc/CAA3-YKEW] (last visited Jan. 15, 2018).

67. Jordan & Mitchell, *supra* note 45, at 255 (illustrating the widespread nature of the adoption of data-intensive machine-learning methods).

68. *See supra* note 23 and accompanying text.

69. *See, e.g.*, Larry Hardesty, *Artificial-Intelligence System Surfs Web to Improve Its Performance*, MIT NEWS (Nov. 10, 2016), http://news.mit.edu/2016/artificial-intelligence-system-surfs-web-improve-performance-1110/ [https://perma.cc/2DJK-JKBT].

70. William Hochberg, *When Robots Write Songs*, THE ATLANTIC (Aug. 7, 2014), https://www.theatlantic.com/entertainment/archive/2014/08/computers-that-compose/374916 [https://perma.cc/SMQ6-LCDY]. EMI is a software program that, although not intelligent, has produced aesthetically convincing new music. Intelligence seeks survival by the exercise of power over a surrounding environment. In composition, intelligence equals decision making. Every composition results from the selection of a finite set of constraints to operate on selected materials; even the most intuitive decision remains itself a decision, and consequently, a product of constraints. *See* Patrício da Silva, *David Cope and Experiments in Musical Intelligence*, SPECTRUM PRESS 1-36 (2003), http://eclass.uoa.gr/modules/document/file.php/MUSIC124/%CE%94%CE%B9%CE%B1%CE%BB%CE%AD%CE%BE%CE%B5%CE%B9%CF%82/da-silva-david-cope-and-emi.pdf [https://perma.cc/Q8KG-FQRB].

71. *See also* Rana el Kaliouby, *This App Knows How You Feel – From the Look on Your Face*, TED (2015), https://www.ted.com/talks/rana_el_kaliouby_this_

We have already been caught unprepared by the latest developments. Traditional intellectual property laws have become irrelevant for new AI systems. Other fields, such as tort and criminal law, may also be unable to solve the emerging issues. Furthermore, the developments are proceeding rapidly. We have to cope not just with existing automated AI systems that create independent, creative, and original artworks, but we also have to be ready for the next generation of AI that will be capable of unsupervised learning, a paradigm in machine-learning research that uses random methods in unexpected and dangerous ways.[72]

C. What Makes Artificial Intelligence Systems Creative?

Over the past two decades, AI has grown from a laboratory curiosity to a practical technology. It has emerged as an important tool in developing practical software for computer vision; speech recognition; natural language processing; and creating artworks, inventions, and other applications.[73] To understand the challenges posed by AI-created artworks, it is important to understand how automated AI systems produce new and creative works, which would have been copyrightable had humans created them.[74]

I identify ten features of AI systems' algorithms that are important to the discussion of accountability of AI systems based on the copyright discourse.[75] AI systems can be embedded with all or some of these features, all of which are interrelated and partially overlapping. By using these ten features, AI systems are designed to independently create works of useful art.[76]

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app_knows_how_you_feel_from_the_look_on_your_face [https://perma.cc/FY39-29AN].

72. HASTIE, TIBSHIRANI & FRIEDMAN, *supra* note 46, at 18-22 (stressing a principled model-based approach, often using the language of graphical models to specify models in a concise and intuitive way).

73. Yanisky-Ravid & Liu, *supra* note 38, at 2.

74. *Id.*

75. *See* HALLEVY, *supra* note 11, at 175 (discussing five different attributes that one would expect an intelligent entity to have—communication, internal knowledge, external knowledge, goal-driven behavior, creativity); *see also* Yanisky-Ravid & Velez-Hernandez, *supra* note 32, at 2 (proposing the adoption of the objective approach to copyright, which enables copyrightability of works produced by creative robots).

76. Jason D. Lohr, *Managing Patent Rights in the Age of Artificial Intelligence*, LEGALTECH NEWS (Aug. 18, 2016), http://www.legaltechnews.com/id=1202765385194/Managing-Patent-Rights-in-the-?slreturn=20160819081749 [https://perma.cc/6BTC-9DLR] (arguing that much of the AI in the use today is

(1) Creativity. AI systems are capable of more than just copying other works from accessible sources. They operate as creative devices capable of creating entirely new and original works.[77] This feature is crucial in the intellectual property realm and in particular when discussing copyrightable artworks.

(2) Autonomous and independent.[78] A device is independent or autonomous if it can accomplish a high-level task on its own, without external intervention.[79] Such systems may work independently, with minimum human intervention.[80] In this way, the AI systems are able to replace authors and other creators, to autonomously produce new artworks.[81]

(3) Unpredictable and new results. AI systems are based on algorithms capable of incorporating random input, resulting in unpredictable routes to the optimal solution, and hence creating unpredictable works (from the software programmers' point of view).[82] An AI system can draw a new painting, which, unlike copying an existing work, is new and unpredictable. After being exposed to colors, shapes, and techniques that are in the public

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referred to as "soft" AI systems, where the AI uses computational intelligence to analyze relevant data and attempt to solve a specific problem).

77. *See* HUTTER, *supra* note 51, at 2 (mentioning creativity as one of the main features of AI); *see also* Scherer, *supra* note 48, at 364-65 (describing how AI systems detected breast cancer prognosis by checking cells of supportive tissues through a chess player creative move); HALLEVY, *supra* note 11, at 176 (arguing that an AI system must be creative by finding alternative ways to solve problems).

78. Crootof, *supra* note 19, at 1854-63 (describing the difficulty of deciding on a definition for autonomous weapons and suggesting a definition based on the AI (weapon) system being able (1) to come to conclusions (2) derived from gathered information and (3) is capable of independently selecting actions (selecting and engaging targets)).

79. Lucy Suchman & Jutta Weber, *Human-Machine Autonomies*, *in* AUTONOMOUS WEAPON SYSTEMS: LAW, ETHICS, POLICY 75, 76 (Nehal Bhuta et al. eds., 2016).

80. *See* Terence Davis, *The AI Revolution: Is The Future Finally Now?*, ARN (Apr. 14, 2017), https://www.arnnet.com.au/article/617707/ai-revolution-future-finally-now [https://perma.cc/UX4T-XAAB] ("What is called AI even today is in fact, the leveraging of machines with minimal – though not zero – human intelligence to solve specific, narrow problems.").

81. *See generally* Yanisky-Ravid & Velez-Hernandez, *supra* note 32.

82. *See* Jonathon Keats, *John Koza Built an Invention Machine*, POPULAR SCI. (Apr 19, 2006), https://www.popsci.com/scitech/article/2006-04/john-koza-has-built-invention-machine [https://perma.cc/3ZB3-79LJ].

domain, the system can "break" the data into digital components, recompose them, and create new and unexpected artworks.[83]

(4) Capable of data collection and communication with outside data. A significant feature of an AI system is that it can actively "search" for outside data. For example, e-David might autonomously take pictures of the outside word and draw them into new, original, and creative works. Communication is thus a necessary feature of an AI system.[84]

(5) Learning capability. Based on the data it has gathered, an AI system can continue to process data by receiving feedback and improving the results.[85]

(6) Evolving. As a result of the new input and the AI system's capacity for continuous processing, the system might constantly find new patterns and similarities and hence change the outcomes. In this sense, the system is constantly evolving. This feature is at the core of AI and data science.[86]

(7) Rational-intelligent system. An intelligent system is one with a rational mechanism capable of perceiving data and deciding which activities or omissions would maximize its probabilities of success in achieving a certain goal.[87]

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83. *See* Lawrence Hunter, *Molecular Biology for Computer Scientists*, *in* ARTIFICIAL INTELLIGENCE AND MOLECULAR BIOLOGY 1, 12-15 (Lawrence Hunter ed., 1993) (describing how similarities enable the composition of cells by its parts as membranes, proteins and other parts by AI systems).

84. *See generally id.*; *see also* Deussen et al., *supra* note 1, at 1 (discussing how, as part of the Rembrandt project, the robot had a camera that kept on photographing); Matthew Field, *Facebook Shuts Down a Robots After They Invented Their Own Language*, THE TELEGRAPH (Aug. 1, 2017, 10:21 AM), http://www.telegraph.co.uk/technology/2017/08/01/facebook-shuts-robots-invent-language/ [https://perma.cc/8FRE-67VZ] (the chatbots were meant to learn how to negotiate by mimicking human trading and bartering; however, when the social network paired two of the programs, nicknamed Alice and Bob, to trade against each other, they started to develop their own bizarre form of communication that the researchers could not understand).

85. RUSSELL & NORVIG, *supra* note 49, at 928-69 (explaining the process of perception of AI systems, in which the systems are being connected to the raw world, including image formation, color, edge detection, texture, segmentation of images, objects recognition, reconstructing the 3D world, and motions).

86. Jordan & Mitchell, *supra* note 45, at 255, 257 (discussing recent progress in machine learning and illustrating the wide-spread nature of the adoption of data-intensive machine-learning methods).

87. RUSSELL & NORVIG, *supra* note 49, at 3-4, 27, 34-56, 973-85 (describing AI systems as being capable of taking "rational" actions based on environmental input); *see also* HUTTER, *supra* note 51, at 2, 125-26, 231 (discussing how AI systems can solve problems by using features such as learning, induction,

(8) Efficiency. AI systems are capable of accurately, efficiently, and rapidly processing vast volumes of data—well beyond the ability of the human brain.[88]

(9) "Free choice." AI systems are able to choose between alternatives in order to arrive at the best outcome.[89] E-David, for example, chooses between lights, colors, and shapes while drawing.[90]

(10) Goal oriented. AI systems function according to goals such as creating, drawing, writing stories or news, or composing melodies or poems.[91]

AI systems that create artworks incorporate, to a certain level, all of these ten features. Once we understand these features, and that the AI systems create outcomes independently and autonomously, we realize that the rights available under copyright laws cannot be afforded only to human authors, and thus, the traditional copyright laws may be inapplicable.[92] As technology advances, AI systems have become increasingly capable of mimicking part of the functions that we once considered intrinsic to the human mind's creativity. AI

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deduction, building analogies and optimization, as well as using knowledge); DAVID L. POOLE & ALAN K. MACKWORTH, ARTIFICIAL INTELLIGENCE: FOUNDATION OF COMPUTATIONAL AGENTS 71, 283-334, 597-611 (2010) (describing AI systems as agents of cognitive skills such as: problem solving, searching for data, learning and evolving, rational planning, and more).

88. GEORGE F. LUGER, ARTIFICIAL INTELLIGENCE: STRUCTURES AND STRATEGIES FOR COMPLEX PROBLEM SOLVING 26 (6th ed. 2016) (arguing that AI can refer to all programming techniques trying to solve problems more efficiently than algorithmic solutions and can operate close to the intelligence of human behavior); Woodrow Hartzog et al., *Inefficiently Automated Law Enforcement*, 2015 MICH. ST. L. REV. 1763, 1765-67, 1793-95 (arguing that automated machines are more efficient than human but this is a risky factor and that law enforcement of automated machine should preserve inefficiency for ethical reasons).

89. Scherer, *supra* note 48, at 361-62 (arguing that even when AI systems act rationally, they can still pose public risk—killing efficiently, for example).

90. *See supra* note 1 and accompanying text.

91. *See supra* note 66.

92. RUSSELL & NORVIG, *supra* note 49, at 4-7. The discourse about AI systems includes controversial arguments about the philosophy regarding AI systems. For example, can machines perceive and understand (i.e., can they pass the Chinese test)? Are human intelligence and machine intelligence the same (i.e., can they pass the Turing test)? What is intelligence? What does it mean that a machine think or act rationally; can a machine be self-aware? Can a machine be original or creative? *Id.* However, one must also be aware of the "Eliza Effect." *See* ROBERT TRAPPL, PAOLO PETTA & SABINE PAYR, EMOTIONS IN HUMAN ARTIFACTS 353 (Robert Trappl, Paolo Petta & Sabine Payr eds., 2002) (describing the "Eliza Effect" as the tendency for people to treat machines or programs that are responsive as having more intelligence than they really do, as having human traits, and finding analogies between human behaviors and computer behaviors).

systems will be able to improve specific human skills, not only in terms of accuracy or capacity to process vast amounts of data, but also in terms of creativity, autonomy, novelty, and other features necessary for establishing copyrightable works. Moreover, autonomous AI systems will be able to develop new artworks without significant guidance or instructions from humans.[93]

Generally, the human or entity behind the process is at the forefront of legal discussions. This Article calls for a different solution, one from an alternate point of view—the intellectual property and copyright laws at stake in this area. The inquiry begins with considering whether AI systems may own the products they produce. While this Article agrees that understanding the human-like features of AI may lead to the conclusion that an artwork being generated by an AI system might belong to the AI system, unlike other scholars, this Article argues that the traditional copyright laws may be irrelevant and inapplicable to these situations and that either modifications or other legal tools should replace them.[94] The next Part will begin by addressing the discourse of ownership and accountability for AI systems producing original works.

II. ACCOUNTABILITY FOR AUTONOMOUS AI SYSTEMS—THE COPYRIGHT PERSPECTIVE

AI systems are commonly used to generate works for personal or industrial goals. Who should benefit from the works being produced by the AI systems? Who should bear responsibility when something goes wrong? In other words, who is entitled to the rights? Who should be accountable when AI systems infringe on third parties' rights or counterfeit existing works? Should it be the programmers, the trainers, the users, or, perhaps, the AI systems themselves?

93. *See* Ryan Abbott, *I Think, Therefore I Invent: Creative Computers and the Future of Patent Law*, 57 B.C. L. REV. 1079, 1080 (2016) (stating that AI systems and computers are already generating patentable inventions and arguing that AI should receive patent rights in its inventions); *see also* Lohr, *supra* note 76 (discussing how AI systems will be able to able to operate without significant guidance or instruction and to develop new products and processes).

94. *See* Abbott, s*upra* note 93, at 1080-81 (stating that AI systems own the IP rights).

A. Accountability Matters

Advanced technologies, such as AI systems, are forcing us as a society to face new ethical and legal challenges and to rethink basic concepts such as ownership and accountability. Scholars have not yet deeply discussed the notion of copyright accountability for infringements involving AI systems, even though AI systems are themselves copyrightable.

According to scholars such as Hanoch Dagan, Michael Heller, and others, ownership of property rights (applicable also to intellectual property rights) is not merely a question of benefits arising from the right to exclude others from enjoying, using, or licensing the objects.[95] It is also a question of accountability for using it with consideration for other humans' and entities' rights. Moreover, ownership may also entail rights of others to enjoy the property.[96] This is also true when discussing AI systems. Adopting this accountability for property rights approach of Dagan and Heller into the discussion on intellectual property rights, in regard to works generated by AI systems, allows us to bind together the benefits and accountabilities of ownership.

The main risk we face today and in the near future is that of losing control over the operation of AI systems.[97] Moreover, we risk losing control not only of one AI system, but also two or more AI systems acting in concert "behind our backs." Therefore, I have decided to focus on accountability for works generated by AI systems[98] as AI systems threaten all social and legal regimes.[99]

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95. Hanoch Dagan & Michael A. Heller, *The Liberal Commons*, 110 YALE L.J. 549, 559-60 (2001) (seeing ownership of property as accountability for others); Hanoch Dagan, *Pluralism and Perfectionism in Private Law*, 112 COLUM. L. REV. 1409, 1421-22, 1438-39 (2012) (property law regimes cannot be based on the right of exclusion alone; rather, they must be based on human relationships).

96. *See* Schlackman, *supra* note 5.

97. *See Research Priorities for Robust and Beneficial Artificial Intelligence*, FUTURE OF LIFE INST., https://futureoflife.org/ai-open-letter [https://perma.cc/8FL8-UP6Q] (last visited Jan. 15, 2018).

98. Ariel Ezrachi & Maurice E. Stucke, *Artificial Intelligence & Collusion: When Computers Inhibit Competition* 37-38 (Oxford Legal Studies Research Paper No. 18; Univ. of Tenn. Legal Studies Research Paper No. 267, 2015). *See also* Field, *supra* note 84.

99. ARIEL EZRACHI & MAURICE E. STUCKE, VIRTUAL COMPETITION: THE PROMISE AND PERILS OF THE ALGORITHM-DRIVEN ECONOMY 56-82, 85-144, 147-202 (2016) (describing how consumers reap many benefits from online shopping and how the sophisticated algorithms behind online retail are changing the nature of market competition, including in negative ways. The authors describe one danger as

Professor Jack Balkin describes several problems of AI systems.[100] The first problem entails the distribution of rights and responsibilities among human beings when non-human agents create benefits, like artistic works, or cause harms, like physical injuries.[101] The difficulty arises from the fact that the behavior of robotic and AI systems is "emergent," meaning their actions may be unpredictable or unconstrained by human expectations.[102] Robotics and AI thus feature emergent behaviors that escape human planning and expectations.[103] Balkin further cautions that we should not consider all features of a technology to be essential without first considering how the technology is used in society.[104] It would thus be unhelpful to codify certain features as "essential" because they may in reality be transient features arising from current uses and social trends.[105]

B. AI Systems as Independent Legal Entities: The Personhood and Consciousness Approach vs. The Firm Approach

Many scholars have recently adopted the idea that autonomy, creativity, and spontaneous evolution of AI systems leads to the recognition of AI systems (and robot embedded systems) as independent legal entities entitled to legal and commercial rights and duties.[106] In other words, scholars argue that the AI system is an

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being computers colluding with one another. They describe a second danger as behavioral discrimination based on companies tracking and profiling consumers to get them to buy goods at the highest price they are willing to pay. The authors posit a third danger as the "frenemy" relationship between super-platforms and independent app developers. They caution that data-driven monopolies dictate the flow of personal data and determine who gets to exploit potential buyers); Crootof, *supra* note 19, at 1842-43 (describing the threat of tort war over autonomous weapons).

100. *See* Jack M. Balkin, *The Path of Robotics Law*, 6 CALIF. L. REV. CIR. 45, 45 (2015).

101. *See id.* at 46, 48-49.

102. *See id.* at 45-46.

103. *Id.* at 46 (arguing that robotics and AI raise the "substitution effect," meaning people will substitute robots and AI agents for living things but only in certain ways and only for certain purposes. Balkin argues this substitution is likely to be incomplete, contextual, unstable, and often opportunistic).

104. *See id.* at 45.

105. *Id.* (contending that innovation in technology is not just about tools and techniques, but also economic, social and legal relations, which in turn affects how technologies may change).

106. SAMIR CHOPRA & LAURENCE F. WHITE, A LEGAL THEORY FOR AUTONOMOUS ARTIFICIAL AGENTS 1-3 (2011) (arguing for the legal personhood of an artificial agent that will soon be independent, and discussing the artificial agent as

autonomous legal entity that may, and should, be responsible for the outcome of its own actions or omissions.[107] This conclusion may be based on two alternative premises. First, the defining features of AI systems—intelligence, rationality, independence, and the like—are similar to those of humans; therefore, they should be treated as independent entities with legal rights and duties. Alternatively, AI systems are analogous to firms, which are separate, non-human legal entities capable of possessing legal rights, benefits, and responsibilities.

1. *The Personhood and Consciousness Approach to AI Systems*

Can robots be human persons and hence entitled to legal rights (and duties)? Can Ava, one of the robots in the movie Ex Machina, be considered the owner of the copyright in her painting and have the duty to avoid infringing other humans' or robots' rights?[108] Or can only humans be persons?

"Artificial intelligence already exhibits many human characteristics. Given our history of denying rights to certain humans, we should recognize that robots are [like] people and have human rights."[109] This statement by Harvard Law Professor Glenn

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capable of having "knowledge" and decision-making ability); Abbott, *supra* note 93, at 1080 (arguing that artificial intelligence systems should be considered inventors for the purposes of patent law). *See also* JOHN FRANK WEAVER, ROBOTS ARE PEOPLE TOO: HOW SIRI, GOOGLE CAR, AND ARTIFICIAL INTELLIGENCE WILL FORCE US TO CHANGE OUR LAWS 1, 3-4 (2014) (arguing that robots are independent entities).

107. Abbott, *supra* note 93, at 1080 (arguing that computers are already generating patentable subject matters qualifying as inventors and overtaking human inventors as primary source of new discoveries and inventions, and therefore, AI should receive patent rights in their inventions). *See also* Colin R. Davies, *An Evolutionary Step in Intellectual Property Rights – Artificial Intelligence and Intellectual Property*, 27 COMPUTER L. & SECURITY REV. 601, 617-19 (2011), http://www.sciencedirect.com/science/article/pii/S0267364911001518 [https://perma.cc/RR6K-W56M] (claiming that the systems can be the authors and the inventors).

108. EX MACHINA, *supra* note 24.

109. Glenn Cohen, *Should We Grant AI Moral and Legal Personhood?*, ARTIFICIAL BRAIN (Sept. 24, 2016), http://artificialbrain.xyz/should-we-grant-ai-moral-and-legal-personhood [https://perma.cc/ELL3-CQRK]; *see also* Big Think, *A.I. Ethics: Should We Grant Them Moral and Legal Personhood?*, YOUTUBE (Sept. 23, 2016), https://www.youtube.com/watch?v=gvcbOSAkF2M [https://perma.cc/6QAR-2W4N] (discussing the distinction between people and human beings, and suggesting granting more rights to AI systems so that we do not err and find ourselves on the wrong side of history even though, at the heart of the matter, the idea scares a lot of people).

Cohen reflects not only his claim that AI already does much of what human beings can do, but also the reality that the digital software of AI systems, which mimics human intelligence, is already far superior to our own.[110] Ongoing developments in natural language and emotion detection suggest that AI will continue its encroachment on the domain of human abilities.

The personhood approach to AI systems sees the systems as capable of experiencing consciousness. The goal of the artificial consciousness approach is to explore the cognitive abilities in robots.[111] Igor Aleksander suggested more than a dozen principles for artificial consciousness, including conscious and unconscious states, learning, memorizing, prediction, self-awareness, representation of meaning, language, will, instinct, and emotion.[112] The aim of artificial consciousness is to define whether and how these and other aspects of consciousness can be synthesized in an engineered artifact such as a digital computer.

By virtue of modeling itself, AI systems have sensations and are able to make decisions freely. This can be regarded as having consciousness.[113] The ability to produce consciousness—the ability to experience things, which is found in humans as well as in AI systems—means the ability to recognize, allocate, organize, and recall cognitive sources. Consciousness occurs when we have a symbol for things. We do not know what taste or smell means for any individual human, but we can recognize it by connecting it to an existing symbol.[114] This may also be true for AI systems. This approach of computationalism sees the human brain, essentially, as a

110. *See* Cohen, *supra* note 109.

111. James A. Reggia, *The Rise of Machine Consciousness: Studying Consciousness with Computational Models*, 44 NEURAL NETWORKS 112, 112-31 (2013) (describing the artificial consciousness approach also known as AC).

112. *See generally* Igor Aleksander, Machine Consciousness, *in* BLACKWELL COMPANION TO CONSCIOUSNESS (Max Velmans & Susan Schneider eds., 2007).

113. Drew McDermott, *Artificial Intelligence and Consciousness*, *in* THE CAMBRIDGE HANDBOOK OF CONSCIOUSNESS 117, 140-150 (Philip David Zelazo, Morris Moscovitch & Evan Thompson eds., 2007) (claiming that tests such as the Turing test and the Chinese box test are not necessarily relevant to the computational theory of consciousness. In Turing's test a person tries to distinguish a computer from a person by carrying on typed conversations with the computer. If the person who judges the system thinks the computer is human about 50% of the time, then the computer passes the test and is considered less distinguishable from a human. The Chinese Box test concerns situations where a machine uses inputs to create reasonable and logical outcomes, but does not "understand" how or why those outcomes are the correct responses).

114. *Id.* at 118.

computer.[115] Once we establish the concept of an impersonal level of meaning in brains and computers, we can introduce the idea of a self-model, a device that a robot or a person could use to answer questions about how it interacts with the world.[116] This idea was introduced by Minsky almost forty years ago, and has since been explored by others.[117] Other scholars claim that "consciousness is a property of complex systems that have a particular 'cause-effect' repertoire."[118] They interact with the world in ways similar to the way the brain does. "If you were to build a computer that has the same circuitry as the brain, this computer would also have consciousness associated with it. . . . However, the same is not true for digital simulations."[119]

This approach sees the AI system as a person and thus as capable of bearing rights and duties. An alternative approach imposes rights and duties on AI systems from a different angle—that of the firm approach.

2. *The Corporate Approach*

The corporation as a legal entity can serve as a legal basis for imposing rights and duties on AI systems. Corporations are legal entities subject to a legal regime, including corporate, labor, and even criminal law.[120] Therefore, the question relating to AI entities has become: Does the growing intelligence of AI entities subject them, as any other legal entity, to legal social control?[121]

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115. *Id.*

116. *See generally id.* at 117-150.

117. *See* MARVIN L. MINSKY, SEMANTIC INFORMATION PROCESSING 1 (Marvin Minksy ed., 1968) (discussing multiple experiments that explored intelligent machines nearly four decades ago); Aaron Sloman & Ron Chrisley, *Virtual Machines and Consciousness*, 10 J. CONSCIOUSNESS STUD. 1, 18 (2003).

118. Antonio Regalado, *What it Will Take for Computers to Be Conscious*, MIT TECH. REV. (Oct. 2, 2014), https://www.technologyreview.com/s/531146/what-it-will-take-for-computers-to-be-conscious [https://perma.cc/JPP5-LBSD].

119. *Id.*

120. *See* STEVEN BOX, POWER, CRIME AND MYSTIFICATION 16-79 (1983); John C. Coffee, Jr., "*No Soul To Damn: No Body To Kick": An Unscandalized Inquiry into the Problem of Corporate Punishment*, 79 MICH. L. REV. 386, 386-87 (1981); Brent Fisse & John Braithwaite, *The Allocation of Responsibility for Corporate Crime: Individualism, Collectivism and Accountability*, 11 SYDNEY L. REV. 468, 469 (1988).

121. *See generally* Bruce G. Buchanan & Thomas E. Headrick, *Some Speculation About Artificial Intelligence and Legal Reasoning*, 23 STAN. L. REV. 40 (1970); E. Donald Elliott, *Holmes and Evolution: Legal Process as Artificial*

There are several consequences to this approach. In Europe, for example, there is a strong movement arguing that robots should pay taxes.[122] Scholars have also proposed that AI systems should be held liable for any criminal offenses committed by the systems.[123]

If assessed through the lens of copyright laws, this approach would result in AI systems' ownership of the intellectual property products and processes they generate.[124] Under this view, the AI system is the protagonist: when it acts autonomously, it is the true creator or producer of the products. In this case, the owner might be the AI system itself. Section 201(a) of the Copyright Act states that "[c]opyright in a work protected under this title vests initially in the author[.]"[125] The U.S. Supreme Court has explained that, as a general rule, "the author is the party who actually creates the work."[126] Scholars have also endorsed this position, arguing that the AI system

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Intelligence, 13 J. LEGAL STUD. 113 (1984); Antonio A. Martino, *Artificial Intelligence and Law*, 2 INT'L J.L. & INFO. TECH. 154 (1994); L. Thorne McCarty, *Reflections on* Taxman*: An Experiment in Artificial Intelligence and Legal Reasoning*, 90 HARV. L. REV. 837 (1977); Edwina L. Rissland, *Artificial Intelligence and Law: Stepping Stones to a Model of Legal Reasoning*, 99 YALE L.J. 1957 (1990).

122. Michaela Georgina Lexer & Luisa Scarcella, The Effects of Artificial Intelligence on Labor Markets – A Critical Analysis of Solution Models from a Tax Law and Social Security Law Perspective (working manuscript) (on file with the authors) (arguing that robots should pay taxes and describing the European practical approach supporting this idea); *see also* Chris Weller, *Bill Gates Says Robots That Take Your Job Should Pay Taxes*, BUS. INSIDER (Feb. 17, 2017, 9:57 AM), http://www.businessinsider.com/bill-gates-robots-pay-taxes-2017-2 [https://perma.cc/J3DJ-PKKN] (describing an interview with Bill Gates where he argued that robot tax could finance jobs taking care of elderly people or working with kids in schools, for which needs are unmet and to which humans are particularly well suited).

123. *See generally* HALLEVY, *supra* note 11 (developing a general and legally sophisticated theory of the criminal liability for AI and robotics).

124. *See, e.g.*, Mark Fischer, *Are Copyrighted Works Only by and for Humans? The Copyright Planet of the Apes and Robots*, DUANE MORRIS BLOG (Aug. 18, 2014), https://blogs.duanemorris.com/newmedialaw/2014/08/18/are-copyrighted-works-only-by-and-for-humans-the-copyright-planet-of-the-apes-and-robots [https://perma.cc/C9Z5-X5AY] (arguing that the future of copyright may someday be in the hands of non-humans).

125. *See* 17 U.S.C § 201(a) (2012) (ownership of copyright).

126. Community for Creative Non-Violence v. Reid, 490 U.S. 730, 737 (1989); *see also* Russ VerSteeg, *Defining "Author" for Purposes of Copyright*, 45 AM. U. L. REV. 1323, 1326 (1996).

should be accountable for the outcome of its own actions or omissions.[127]

Ownership, however, might be a result of a commercial contract and not of copyright laws.[128] This view of AI systems ultimately considers the AI system to be the owner of its works. Scholars, however, have criticized this view on the grounds that it is an untenable proposition.[129] Moreover, the length of protection is designed after the life of the creator.[130] Moral rights, including the entitlement of the author to credit as well as the author's control over changes and modifications to the work, remain unresolved when AI systems generate works.

C. Behind Every Robot There Is a Person: Looking for the Human(s) Behind the Machine

Arthur R. Miller said, "[B]ehind every robot there is a good person."[131] This phrase, which represents the traditional approach to AI in the U.S. and Europe, supports the default view of programmers as the creators entitled to ownership of the works created by the AI systems they have programmed.[132] Under this view, ownership and

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127. Abbott, *supra* note 93, at 1080 (arguing that computers are already generating patentable subject matters qualifying as inventors and overtaking human inventors as primary source of new discoveries and inventions and therefore, AI should receive patent rights in their inventions).

128. *Id.* at 1115-17.

129. *See* Annemarie Bridy, *Coding Creativity: Copyright and the Artificially Intelligent Author*, 5 STAN. TECH. L. REV. 1, 26 (2012); Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1226-28 (1985) (arguing that rights should accrue to the user of the program as the best practical solution); Robert Yu, *The Machine Author: What Level of Copyright Is Appropriate for Fully Independent Computer-Generated Works?*, 165 U. PA. L. REV. 1245, 1263-65 (the author suggests the contribution–rights paradox: from a social policy standpoint, entitling the rights to independent computer-generated works is wrong). *But see* Fischer, *supra* note 124 (arguing that the future of copyright may someday be in the hands of non-humans).

130. *See, e.g.*, Roberta Rosenthal Kwall, *Copyright and the Moral Right: Is an American Marriage Possible?*, 38 VAND. L. REV. 1, 87-88 (1985).

131. Miller, *supra* note 54, at 1045.

132. *See* Robert C. Denicola, *Ex Machina: Copyright Protection for Computer-Generated Works*, 69 RUTGERS U. L. REV. 251, 265, 271, 275 (2016) (stating that a computer user who initiates the creation of computer-generated expression should be recognized as the author and copyright owner of the resulting work); John Frank Weaver, *How Artificial Intelligence Might Monetize Fan Fiction*, SLATE (Dec. 10, 2013, 11:33 AM), http://www.slate.com/blogs/future_tense/2013/

accountability for works generated by AI systems are given to the creators of the AI systems.[133] According to this view, the ownership of works generated by AI systems and, hence, the accountability for these works "belong" to the humans (and the entities working on their behalf) involved in the process of developing the AI systems. The human behind the program—usually the programmer—has become an important figure in other fields of law that involve harm and damages resulting from AI systems, such as criminal law or tort law.[134]

This traditional approach is reflected in various European Union laws. For example, the British Copyright, Designs, and Patents Act of 1988 takes the approach that copyright protection is proper for persons responsible for a computer's creation.[135] The Act states: "In this Part 'author', in relation to a work, means the person who creates it."[136] Even the broader approach regarding computers generating artworks is looking for the person behind the creation process. Article 9(3) of the Act says: "(3) In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken."[137]

The U.S. also holds this attitude, as reflected by the National Commission on New Technological Uses of Copyrighted Works (CONTU), which was created to advise Congress on whether then-emerging technologies necessitated a change in copyright laws.[138] CONTU concluded that computers were, at least at that time, merely tools for facilitating human creativity.[139] According to this approach,

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12/10/ai_intellectual_property_rights_how_artificial_intelligence_might_monetize.html [https://perma.cc/Z2D4-YN7K].

133. *See* Yanisky-Ravid & Liu, *supra* note 38, at 6, 18 (discussing inventions being produced by AI systems).

134. *See* David C. Vladeck, *Machines Without Principals: Liability Rules and Artificial Intelligence*, 89 WASH. L. REV. 117, 120-29 (2014); *see also* O'Brien v. Intuitive Surgical, Inc., No. 10 C 3005, 2011 WL 3040479, at *1, *3 (N.D. Ill. July 25, 2011) (granting summary judgment to surgical robot's manufacturer).

135. *See* Copyright, Designs & Patents Act 1988, c. 48, §§ 3, 9 (Eng.).

136. *Id.* § 9(1).

137. *Id.* § 9(3).

138. U.S., FINAL REPORT OF THE NATIONAL COMMISSION ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS 3, 4 (1978), http://www.digital-law-online.info/CONTU/PDF/index.html [https://perma.cc/A5GC-446C] [hereinafter CONTU FINAL REPORT].

139. *See id.* at 45.

> The computer, like [the] camera or [] typewriter, is an inert instrument, capable of functioning only when activated either directly or indirectly by a human . . . [and] affects the copyright status of a resultant work no more than the employment of a still or motion-picture camera, a tape recorder, or typewriter.[140]

Entities, such as employers and firms, are thus entitled to copyright ownership as the transferees of those programmers.[141]

This Article criticizes this traditional approach and calls on policymakers to revisit copyright laws in light of already-existing advanced technology and the latest developments in AI systems.[142] I argue that, inevitably, current copyright law will not be able to cope with AI systems' productivity and creativity.[143] One reason is that too many stakeholders are involved in the process of creating the AI system itself, with no one acting as the main contributor.[144] This point of view holds the contributors involved in the process as owners of the AI system, and thus the ones responsible for works generated by the AI system.[145]

1. *Who Could the Owner Be?*

The candidates for ownership of, and subsequent accountability for, AI works vary from one case to another.[146] However, entitlement to these rights depends on each candidate's direct or indirect contributions to the AI system.[147] I claim that due to the multi-player model, most of the time, the candidates who are involved in the development and manufacture of the AI system do not meet the threshold of authorship.[148] The programming and algorithms used by robots and AI systems may be the work of many hands and may employ generative technologies that allow innovation at multiple

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140. *Id.* at 44-45.

141. *Copyright Ownership: Who Owns What?*, *supra* note 10.

142. *See* Fischer, *supra* note 124 (noting that non-human systems will created copyrightable works).

143. *See id.*

144. *See* Yanisky-Ravid & Liu, *supra* note 38, at 20 (suggesting that multiple stakeholders in inventions created by AI systems disrupts the traditional patent process because there is no single inventor).

145. *See id.* (discussing inventions being produced by AI systems).

146. *See id.* (discussing ownership in the context of responsibility for infringement).

147. *See id.* In the case of The Next Rembrandt, one entity included all the players.

148. *See id.* (describing the multi-player model in regard to AI systems generating inventions).

layers.[149] These features of robotics and AI enhance unpredictability and complicate causal responsibility for what robots and AI systems do.[150] In addition to the AI system software programmers, there are (too) many players and stakeholders that contribute to the process of creating, designing, developing and producing the AI systems themselves, but not the product autonomously produced by the AI systems. Among others are the data suppliers, trainers, feedback suppliers, holders of the AI system, system operators, employers or investors, the public, and the government. The large number of players significantly weakens each player's individual contribution and thus the bond between the software programmers and the products produced by the AI systems. There are many options for who should own the works created by AI systems and, indeed, one role may overlap with another. The following discussion will focus on some of these players.

First, there are the programmers of the AI system. Second, there are the trainers or the data providers, who may be among the most important figures shaping the final functions of the AI systems. Third, there are the feedback providers, or individuals whose task is to provide the AI system with a signal that allows it to distinguish right from wrong and sometimes to select the best result from many random, meaningless results.[151] Fourth, there is the AI system's owner, whether that system is hardware or software. The owner might be the corporation, as the owner of the hardware (robot) or the software, or it might be the buyer of the AI systems (or robots). Fifth, there is the operator of the AI system, or the person who activates the system and enables its creation (although, it should be noted, some advanced AI systems can operate by themselves without a human operator).[152] If one applies a practical approach, the operator could also be the manufacturer.[153] Sixth, there is the buyer of the

149. *See* Balkin, *supra* note 100, at 53 (noting that AI has innovation at multiple layers).

150. *See id.* (discussing causal responsibility of AI based on multiple hands working on programming and algorithms).

151. *See* Abbott, *supra* note 93, at 1082 (arguing "a computer's owner should be the default assignee of any invention, both because this is most consistent with the rules governing ownership of property, and because it would most incentivize innovation"); Weeks, *supra* note 30, at 93.

152. *See* Samuelson, *supra* note 129, at 1205 (discussing the role of the programmer and the programmer's claims to ownership).

153. *See generally* RICHARD T. WATSON, INFORMATION SYSTEMS (2012) (explaining the roles of manufacturers in AI systems).

product.[154] Seventh, the government or governmental entities could be entitled to ownership of products as a default or as a representative of the public. Eighth, the public could also be one of the candidates for ownership in cases of public domain policy.[155] Furthermore, different paradigms of ownership can exist regarding the suggested owners of works created by AI systems. In regard to these options, ownership could be sole ownership by one player or co-ownership by multiple stakeholders.

I argue that none of the players are entitled to ownership of the works generated by AI systems nor are they accountable for these works. Because of the features of AI systems—creative, autonomous, unpredictable, and evolving—none of the players can directly claim ownership and accountability of the works generated by AI systems. Furthermore, there are too many players involved in the process, and none of the players are the main contributor to the creation of the work. For example, although data and feedback providers are crucial to the process, they cannot be considered as owners because they are not authors. Thus, only one figure—the programmer—remains as a candidate for ownership and accountability.[156]

2. *Distinguishing Between the Rights over Artificial Intelligence Software; the Rights of Works Produced by Automated AI Systems; and the Rights of Programmers*

For traditional artworks, the creators (or, in some cases, their employers or main contractors) are entitled to copyright over the artworks they produce, subject to several conditions.[157] As discussed above, developing the next generation of creative AI systems involves many participants, including software programmers and the

154. *See* Samuelson, *supra* note 129, at 1207-08.

155. *See* Muzdalifah Faried Bakry & Zhilang He, *Autonomous Creation – Creation by Robots: Who Owns the IP Rights?*, MAASTRICHT U. (Mar. 5, 2015), https://law.maastrichtuniversity.nl/ipkm/autonomous-creation-creation-by-robots-who-owns-the-ip-rights [https://perma.cc/2YCC-RPER] (arguing that artificial intelligence belongs in the public domain); Natasha Lomas, *We Need To Talk About AI and Access to Publicly Funded Data-Sets*, TECHCRUNCH (July 9, 2016), https://techcrunch.com/2016/07/09/we-need-to-talk-about-ai-and-access-to-publicly-funded-data-sets/ [https://perma.cc/G7KZ-97CN] (explaining public domain data on Google).

156. *See* Samuelson, *supra* note 129, at 1205 (discussing the role of the programmer and the programmer's claims to ownership).

157. *See Copyright Ownership: Who Owns What?*, *supra* note 10.

companies for which they are working or those who commissioned the algorithm that generated the work, trainers that provide the data, and many other contributors.[158] The work itself, however, might be created digitally by an AI system embedded in a computer. I argue that the programmers of the software may be entitled to the copyright of the program, but may not necessarily have the rights for future products created by the AI system. I support this claim both conceptually and legally.

Conceptually, I argue that AI systems reflect a discipline focused on three inter-related components that are similar to the "human" traits of intelligence. First, unlike traditional software, the similarities and interconnections that the AI systems identify or find, process, remember, use, and implement may, in many cases, be unknown to the programmer. Second, in contrast to fixed and framed software, the AI system evolves and develops as a result of new input and new results. Third, the AI system's works are significantly unpredictable because the system constantly and automatically evolves through its experiences.[159] In short, because of their intelligence components, AI systems are not only more accurate, of higher quality, and faster at processing details, but are also capable of creating unpredictable, original, and creative artworks and other products—all of which are unknown to their programmers. Therefore, these works created by AI systems could have been copyrightable under U.S. copyright laws.[160]

Legally, the rights of an AI software program and the rights of artworks can be distinguished from one another. Software is usually protected not only by copyright laws, but also by the Constitution of the United States,[161] which grants exclusive rights to "Authors and Inventors" in their respective "Writings and Discoveries."[162] However, the discourse about software ownership is distinct from the question of ownership of products (and services) produced by AI systems. One question that remains is whether the works produced by AI systems should or could be entitled to copyright protection. Can AI-generated works be regarded as proper "works of authorship" pursuant to § 102 of the Copyright Act by virtue of AI's

158. *See supra* Part I (listing the AI participants).

159. *See, e.g.*, Bridy, *supra* note 129, at 20 (explaining requirements for copyrighting); *see also supra* note 66.

160. *See, e.g.*, Bridy, *supra* note 129, at 20 (explaining requirements for copyrighting).

161. *See* U.S. CONST. art. I, § 8, cl. 8.

162. *See id.*

sufficient nexus to human creativity?[163] Should this protection (if it does exist) also be applied to inventions produced by AI systems?[164] On the one hand, I do not challenge the programmers' entitlement to copyright ownership in the software they develop, but on the other hand, I argue that the entitlement to the software does not automatically result in ownership over the products created by AI systems.[165] I further conclude that the software programmers are not the owners of the works produced by AI systems, just as the owner of a brush or a camera does not hold the rights over the painting or the photo produced by those objects.

The distinction between programming the AI software itself and authoring the works the automated AI machine creates can be better understood by thinking about a piano and the author of the melodies created by using the piano. Imagine a melody that is created by Z playing a piano that was programed and designed by A, manufactured by B, and owned by C. Is the piano (or the ownership of the piano) as the musical instrument, serving as the platform for the creation, relevant to the question of ownership of the melody?[166] I argue that neither the person who produced (or invented) the piano nor the factory that produced it are the owners of the melody created by a third entity (whether a human or an AI system).

Another relevant example would be the well-known selfie taken by a monkey with someone else's camera.[167] In this example, a monkey on the Indonesian island of Sulawesi took a photograph using a camera owned by David Slater, a nature photographer.[168] But

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163. *See* 17 U.S.C. § 102 (1990).

164. *See* § 107 (under Copyright's "fair use" doctrine, others can reproduce the copyrighted inventions for "criticism, comment, news reporting, teaching . . . scholarship, or research"); Thomas Caswell & Kimberly Van Amburg, *Copyright Protection on the Internet*, *in* E-COPYRIGHT LAW HANDBOOK 7-1, 7-8 (Laura Lee Stapleton ed., 2003) (arguing that all who independently create inventions might be entitled to patent rights in order to protect it); Donald S. Chisum, *The Patentability of Algorithms*, 47 U. PITT. L. REV. 959, 1015-16 (1986).

165. *See* RICHARD STIM, GETTING PERMISSION 194 (6th ed. 2016); *see also Copyright Ownership: Who Owns What?*, *supra* note 10.

166. *But see* Pamela Samuelson, Benson *Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025, 1148 (1990) (arguing that the role of the software programmer is crucial).

167. Camila Domonoske, *Monkey Can't Own Copyright to His Selfie, Federal Judge Says*, NPR (Jan. 7, 2016), http://www.npr.org/sections/thetwo-way/2016/01/07/462245189/federal-judge-says-monkey-cant-own-copyright-to-his-selfie [https://perma.cc/5N7J-YKZ5].

168. *See id.*

Slater didn't trip the shutter—the monkey did.[169] The People for the Ethical Treatment of Animals (PETA) filed a lawsuit on behalf of the monkey, arguing that Naruto, the monkey, owns the copyright, which PETA offered to administer on the monkey's behalf.[170] Since the dispute began, "[t]he U.S. Copyright Office . . . has specifically listed a photograph taken by a monkey as an example of an item that cannot be copyrighted. Slater, meanwhile, has a British copyright for the photo, which he argues should be honored worldwide."[171] He has asked the U.S. court to dismiss PETA's claim.[172] "Imagining a monkey as the copyright 'author' in Title 17 of the United States Code is a farcical journey Dr. Seuss might have written," according to Slater's lawyer.[173]

I argue that the producer or the seller of the instrument that served as the platform for producing new works (i.e., the camera, piano, or paintbrush)—like the software programmers or the companies in charge of producing the platform—are unsuitable candidates for being the creators or stakeholders of the works generated by the platform.[174] The owner of the work is the entity that generated the work. I argue that the rights to the AI systems' algorithms, which can be owned by the human creator, are distinct from the rights to the artworks the systems produce.

The code itself will have copyright protection. One could make the claim that the output generated from the computer program is a derivative work product of the underlying copyrighted program, which may also provide copyright protection to whomever holds a copyright in the algorithm. Thus, the holder of the copyright for the algorithm would hold the copyright for the output too.[175] However, in 1973, the Supreme Court interpreted the authorship requirement of the Copyright Act to include "any physical rendering of the fruits of

169. *See id.*

170. *See id.*

171. *See id.*

172. *Id.* (describing how, according to Slater's lawyer, "[t]he only pertinent fact in this case is that Plaintiff is a monkey suing for copyright infringement").

173. *Id.*

174. *See* Naruto v. Slater, No. 15-cv-04324-WHO, 2016 WL 362231, at *1 (N.D. Cal. Jan. 28, 2016); Sarah Jeong, *Judge Gives Monkey Second Chance to Sue for Copyright Infringement*, MOTHERBOARD (Feb. 1, 2016, 3:40 PM), http://motherboard.vice.com/read/judge-gives-monkey-second-chance-to-sue-for-copyright-infringement [https://perma.cc/AG8N-DPMY] (discussing the judge's decision to give PETA leave to amend the complaint and try again to get damages from Slater).

175. *See* 17 U.S.C. § 101 (2012).

creative intellectual or aesthetic labor."[176] The Court concluded that, in most cases, a computer requires a significant amount of input from a human user in order to generate artistic output.[177]

I argue that when the computer produces most of the output independently and creatively, it is less likely that the output might be considered to be the original source of the work and not as derivative work. I do *not* oppose the programmer's entitlement to ownership of the AI system itself. However, I do contest the human behind the machine's point of view and the idea that this entitlement automatically results in the programmer owning the products and processes created by the AI system.[178] I claim that my conclusion influences other cases beyond the intellectual property arena.[179] This brings me to another scenario targeting the AI system itself as being responsible for its own works.

3. *Other Possible Accountable Entities*

In other legal regimes, scholars have suggested strict liability as a solution for addressing the damages caused by AI systems, without blaming either the AI system or its programmers.[180] Strict liability is often employed when it would be too complicated to prove guilt, negligence, or a causal link between the defendant's failure to exercise due care and the damages that occurred.[181] I argue that, due to the autonomous, creative, and unpredictable nature of AI systems, using the traditional strict liability rule on individuals would be unjust and inefficient.

Another option is to target the government or governmental body as being accountable.[182] In some fields, such as international

176. Goldstein v. California, 412 U.S. 546, 561 (1973) (emphasis added).

177. *See id.*

178. *See infra* Section II.C (discussing the human behind the machine point of view and why this Article is critical of it).

179. *See infra* Subsection II.C.3 (discussing accountability implications of the idea that an AI creator does not necessarily own the AI's output).

180. *See* Vladeck, *supra* note 134, at 146.

181. *See, e.g.*, *id.* ("My proposal is to construct a system of strict liability, completely uncoupled from notions of fault for this select group of cases. A strict liability regime cannot be based here on the argument that the vehicles are 'ultra-hazardous' or 'unreasonably risky' for the simple reason that diver-less vehicles are likely to be far less hazardous or risky than the products they replace."). *See also* Crootof, *supra* note 11, at 1394-95 (arguing that autonomous weapons are designed to kill and their independent actions break the chain of causality, thereby making the strict liability rule applicable).

182. *See* Scherer, *supra* note 48, at 394.

law and autonomous weapons, the state is in the best position, at a practical level, to ensure compliance with the law (e.g., that autonomous weapons systems are designed and employed in compliance with international law).[183] States also have deep enough pockets to pay damages to the victims, in addition to being involved in developing, purchasing and using AI systems.[184] According to the proposed model, states as employers or users would bear responsibility for AI systems not because they are states per se, but rather for the reasons mentioned above, due to their status as users.[185] I argue that, at the national level, unlike the international level, responsibility could be forced. There may also be third party accountability.[186] In these solutions, accountability is not necessarily connected to ownership because the works generated by AI systems can be public domain, and copyrights laws may thus not be applicable at all.[187]

I think that, under the copyright regime, these solutions do not efficiently serve the goal of imposing accountability on the player who should—along with enjoying the benefits of using AI systems—also take responsibility for such systems. I have discussed two alternative points of view.[188] First, the AI systems themselves could be the owners and the ones responsible for their works.[189] Second, the humans behind the machine (i.e., those involved in the process of developing the AI systems) could be the owners and the ones responsible for works generated by AI systems.[190] Since neither of these perspectives seems applicable and justified to the questions of ownership and accountability, I now turn to addressing these issues under a theoretical justification framework.

183. *See* Crootof, *supra* note 11, at 1390.

184. *See, e.g.*, Scherer, *supra* note 48, at 357, 394 ("This article will advance the discussion regarding the feasibility and pitfalls of government regulation of AI by examining these issues and explaining why there are, nevertheless, some potential paths to effective AI regulation."). *See also* Crootof, *supra* note 11, at 1389-93 (arguing that states are reluctant to take responsibility regarding autonomous weapons).

185. *See* Crootof, *supra* note 11, at 1390.

186. *See, e.g.*, Vladeck, *supra* note 134, at 148.

187. Yanisky-Ravid & Liu, *supra* note 38, at 18-21 (suggesting that inventions produced by AI systems will not be protected by the patent law).

188. *See supra* Part II.

189. *See supra* Section II.B.

190. *See supra* Section II.C.

III. THEORETICAL JUSTIFICATIONS

Many intuitively feel that AI systems, sophisticated robots, and machines should not be able to have rights and duties; nor should they hold copyrights. This intuition has its roots in strong theoretical and legal arguments.[191] The following discussion will explain the difficulties of seeing AI systems as totally independent from human control. The discourse concerning the justifications for intellectual property focuses on three main substantive theories: law and economics, which examines intellectual property rules according to their cumulative efficiency and ability to promote total welfare; personality theory, which focuses on the personality of the creators; and Lockean labor theory, which justifies the property interest as the fruits of the creator's labor.[192] Today, U.S. intellectual property law is based primarily on the law and economics utilitarianism approach[193] and, in part, John Locke's theory of labor.[194] By contrast, the civil law approach to copyright protection justifies property rights by the importance of the creators' personality in the works (personality approach), as well as by the ownership of the fruits stemming from the person's body and soul (Locke's approach or labor approach).[195]

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191. *See* Shlomit Yanisky-Ravid, *The Hidden Though Flourishing Justification of Intellectual Property Laws: Distributive Justice, National Versus International Approaches*, 21 LEWIS & CLARK L.R. 1, 8-9 (2017).

192. *See id.* at 4-9 (describing the three major approaches to theoretical justifications to intellectual property laws and arguing that distributive justice theory, although discussed by some scholars, is wrongfully considered to be neither a substantial nor a major justification of intellectual property; it is rather seen as an exception or postscript to the mainstream theoretical justifications). *See also* William Fisher, *Theories of Intellectual Property*, *in* NEW ESSAYS IN THE LEGAL AND POLITICAL THEORY OF PROPERTY 168, 169-75 (Stephen R. Munzer ed., 2001) (describing various theories underlying intellectual property); Justin Hughes, *The Philosophy of Intellectual Property*, 77 GEO. L.J. 287, 288-89 (1988) (discussing the different justifications to intellectual property laws).

193. DONALD S. CHISUM ET AL., PRINCIPLES OF PATENT LAW 50 (3d ed. 2004) ("[T]he predominant justification for American intellectual property law has been . . . utilitarianism.").

194. Peter M. Kohlhepp, *When the Invention Is an Inventor: Revitalizing Patentable Subject Matter to Exclude Unpredictable Processes*, 93 MINN. L. REV. 779, 781-82 (2008).

195. *See* Jeanne C. Fromer, *Expressive Incentives in Intellectual Property*, 98 VA. L. REV. 1745, 1746 (2012) (discussing the personality and labor approach to intellectual property); Yanisky-Ravid, *supra* note 34, at 118.

A. Law & Economics

The U.S. system of copyright laws was established to protect original authors and creators by giving them exclusive rights and control over the works they generate.[196] The U.S. Constitution grants Congress the power "To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[197] The main justification for establishing a copyright regime—giving stakeholders property rights, which are broader than the rights established by the contract regime—is based on the theory of law and economics. In short, providing stakeholders property rights promotes the creation of useful art.[198] This, in turn, motivates the creators (or their transferees) to create, expose, develop, and distribute their works, enriching the total welfare of the public.[199] The Copyright Clause, by securing exclusive rights to authors and inventors, aims to "promote the . . . science and the useful Arts."[200]

This Section will focus on copyright law's purpose of promoting the creation of artistic works by establishing an incentive structure through which authors are given exclusive control over the copyright works.[201] Often, however, as a result of a special contract or relationship with the author or creator, other entities are entitled to the copyrights as direct transferees of the actual human creator.[202]

Unlike humans, AI systems do not need incentives to create artworks.[203] It's true that programmers need to be incentivized to

196. U.S. CONST. art I, § 8, cl. 8.

197. *Id.*

198. *Id.*

199. Richard A. Posner, *Intellectual Property: The Law and Economics Approach*, 19 J. ECON. PERSP. 57, 60 (2005) (explaining how the society made an agreement with the authors to grant them exclusive rights for limited duration and then the rights become public domain).

200. U.S. CONST. art. I, § 8, cl. 8.

201. *See* Posner, *supra* note 199, at 57; *see also* 17 U.S.C. § 106 (2017) ("Exclusive rights in copyrighted works."); William M. Landes & Richard A. Posner, *An Economic Analysis of Copyright Law*, 18 J. LEGAL STUD. 325, 326 (1989).

202. SHLOMIT YANISKY-RAVID, INTELLECTUAL PROPERTY IN THE WORKPLACE: THEORETICAL AND COMPARATIVE PERSPECTIVES (2013) (explaining the incentives to create as being part of the law and economics justification as well as other justifications for intellectual property); Pamela Samuelson, *Mapping the Digital Public Domain: Threats and Opportunities*, 66 L. & CONTEMP. PROBS. 147, 156 (2003).

203. *See supra* note 32 and accompanying text.

create and develop advanced, automated AI systems, but programmers, or the entities for which they are working, do hold copyrights over the software.[204] Once we understand the nature of incentives, we understand that they are nevertheless needed to (1) promote the development of AI systems' programming and (2) encourage entities to control the functions of AI systems and to take responsibility for their outcomes. In these cases, ownership might be the most efficient tool for gaining this incentive.[205]

However, we do not need to incentivize robots or AI systems to function. Incentivizing AI systems to generate works they are already internally programed to create is pointless. My argument is rooted in understanding that automated AI systems not only evolve independently after the program has been completed, but also evolve in ways that are unpredictable, even to the human programmers who created them. This conclusion is further drawn from the fact that the connection and similarities that AI systems draw are neither made nor known to the programmers.[206] We can compare this system to human perception via the human brain. The programmers implemented or created the neurons and synapses, but not the electronic messages that will be created in the future and their products.[207] The programmers thus create the systems, but cannot predict the works themselves.[208] Consequently, the creativity of an AI system is not a result of the creativity of the programmers; at the very least, the causal relationship is not close enough to justify ownership (as a tool to incentivize a specific function) in the new works generated by AI machines.[209] The human programmer is only ancillary to the creation of the artworks.

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204. *See* Yanisky-Ravid & Liu, *supra* note 38, at 15.

205. Garrett Hardin, *The Tragedy of the Commons*, SCIENCE, 1243, 1243-48 (1968) (arguing that ownership is efficient to retain property).

206. *See* Yanisky-Ravid & Liu, *supra* note 38, at 2.

207. Julien Vitay, Helge Ü. Dinkelbach & Fred H. Hamker, *ANNarchy: A Code Generation Approach to Neural Simulations on Parallel Hardware*, FRONTIERS NEUROINFORMATICS, July 31, 2015, at 1 (discussing a notable exception, the Brian simulator, "which allows the user to completely define the neuron and synapse models using a simple mathematical description of the corresponding equations [and] uses a code generation approach to transform these descriptions into executable code, [which in turn] allow[s] the user to implement any kind of neuron or synapse model").

208. JAMES GLEICK, WHAT JUST HAPPENED: A CHRONICLE FROM THE INFORMATION FRONTIER 19 (2002).

209. *See* Yanisky-Ravid & Liu, *supra* note 38, at 18-19.

In addition, and as mentioned above, programmers are already incentivized to make creative AI systems because they receive copyright protection for the program itself.[210] Furthermore, because copyright protection does not exist in a vacuum, it must be balanced against competing rights. It is important that the legal regime incentivizes the right people and entities, and ultimately promotes behavior that will increase total welfare.[211] The legal regime has succeeded if programmers who create AI systems are incentivized to do so either through intellectual property protection or patent protection for the machine, copyright protection for its computer code, or both. But if we understand that these legal tools incentivize the AI system or the programmers to create works of authorship, when they are not in fact doing so, the system is failing because it is inefficient. It should be obvious that machines need no incentive to work. In other words, assuming that machines capable of creating unique art already exist, in all likelihood there would be no need to incentivize the creation of these works. Providing AI systems with wires, electronic devices, Internet connection, and materials should be enough.

If, as the law and economics approach contends, copyright is meant to be an incentive structure, and machines do not need to be incentivized to create, then copyrighting the machines' works provides no benefit but does hamper the public's ability to enjoy the work.[212] Thus, giving AI systems rights to the works they create would seemingly operate to take them out of the sphere of copyright altogether.[213] Indeed, the public's or the end-users' interest in appreciating and enjoying works of art should be balanced against the private interest in maintaining exclusive, monopolistic control.[214] Since human creators need to be incentivized to create, copyright used to be the optimal state of affairs for both parties because, without it, much fewer works of art would be created for the public

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210. *See id.* at 15.

211. Tiina Kautio et al., *Assessing the Operation of Copyright and Related Rights Systems*, CUPORE (2016), http://www.cupore.fi/en/research/previous-researches/assessing-the-operation-of-copyright-and-related-rights-systems-142507-14122016 [https://perma.cc/4BM3-SNCA].

212. *See* Yanisky-Ravid & Velez-Hernandez, *supra* note 32, at 7; *see also* Yanisky-Ravid & Liu, *supra* note 38, at 29-30 (arguing that patent laws are not applicable in the 3A era of AI).

213. *See* Yanisky-Ravid & Liu, *supra* note 38, at 8.

214. *See* Julius Cohen, *The Anti-Trust Acts and "Monopolistic Competition": A Case Study*, 24 CORNELL L. REV. 80 (1938).

to enjoy.[215] But in the non-hypothetical future in which machines can create pleasing works of art without limits, I argue that the existing balance would be thrown off. In the case of AI systems, I argue, there wouldn't be any risk of a lack of artistic creation even if copyright law did not exist to protect such creations.[216] Such a reality could, furthermore, pose an existential threat to the entire copyright regime.[217]

Assuming that many people consume works of authorship for their artistic merit, I argue it is likely that machine-produced works could not serve as a perfect replacement for human-authored works. Instead, the market for human-authored works of art would coexist with a market for works "authored" by machines.[218] Since human artists would still need to be compensated, copyright law would persist, at least until machines capable of imparting deeper meaning to their work were created (if such a thing is indeed possible).[219] In addition to being more likely in the near future, this model is perhaps more palatable to policymakers and the general public.

Thus, denying copyright protection for works of authorship created by machines is unlikely to greatly change the existing system. However, as the world becomes more electronically based and cyber-focused (a trend we can already observe), it won't take long until machines, using AI systems, can copy any artistic work precisely (including the signature).[220] This will ultimately destroy the

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215. *See* Jared Green, *Why Public Art Is Important*, DIRT (Oct. 15, 2012), https://dirt.asla.org/2012/10/15/why-public-art-is-important [https://perma.cc/T7NX-E8PA].

216. *See Moral Rights*, ARTS L. CTR. AUSTL., http://www.artslaw.com.au/info-sheets/info-sheet/moral-rights [https://perma.cc/8YNQ-67PA] (last visited Jan. 15, 2018). Moral rights protect the personal relationship between a creator and his or her work even if the creator no longer owns the work or the copyright in the work. Moral rights concern the creator's right to be properly attributed or credited and the protection of his or her work from derogatory treatment. *See id.*

217. *See* Yanisky-Ravid & Velez-Hernandez, *supra* note 32, at 19. *See generally* Tang, *supra* note 34 (explaining how the involvement of digital tools in creation leads to seeing moral right as trademark).

218. *See* Samuelson, *supra* note 129; *see also* Samuelson, *supra* note 166, at 1148 (arguing that the role of the software programmer is crucial).

219. *See generally Artificial Intelligence – Overview*, TUTORIALSPOINT, https://www.tutorialspoint.com/artificial_intelligence/pdf/artificial_intelligence_overview.pdf [https://perma.cc/5M4P-WVZB] (last visited Jan. 15, 2018).

220. *See e.g.*, Shlomit Yanisky-Ravid & Kenneth S. Kwan, *3D Printing the Road Ahead: The Digitization of Products when Public Safety Meets Intellectual Property Rights—A New Model*, 38 CARDOZO L. REV. 921, 923-24 (2017).

incentive to produce these works of art, which, in turn, will eventually destroy the copyright regime.[221]

One possibility is that the AI systems might require electronic licenses, drawn up by electronic agreements,[222] to use their products, as well as electronic contracts creating electronic sanctions for breaching the license (e.g., electronically terminating the infringing works).[223] However, these methods would not need copyright laws, as the theoretical rights and their enforcement would no longer use the traditional court system.[224] Although AI systems might be able to detect infringements easier and in more efficient ways, implementing copyright laws for the purpose of excluding other entities is not the right solution. Doing so would most likely lead to the loss of control and lack of accountability and responsibility that humans have over property and intellectual property rights.[225]

The thought of machines taking over and nullifying copyright law is not just far-fetched; it would also require a tremendous, uncomfortable shift in the legal landscape. After confronting the challenges posed by advanced technology and AI systems that autonomously generate works, it would be a stretch—even in the existing case of a sophisticated neural network AI capable of learning and creating independently—to imagine an AI system that could understand and use the copyright regime as its incentive. Furthermore, it seems non-feasible that AI systems will be capable in the near future of suing in court for ownership rights.[226] I contend that, while preparing and formulating future laws, although theoretically and digitally feasible, it is not likely that AI systems will acquire ownership and sell or give licenses to use their products in the near future. I further claim that even when AI systems will be qualified to possess their own rights and duties, a more theoretically

221. *See id.* at 927.

222. *See* Scholz, *supra* note 17, at 102.

223. *See id.* at 110.

224. *See id.* at 120-21.

225. Yanisky-Ravid & Kwan, *supra* note 220, at 924 (discussing the threat and hazards of 3D printings).

226. The decision earlier this month in the case of *Halo v. Pulse* will give owners of U.S. patents a greater likelihood of being awarded enhanced damages. *See* Frederic Henschel & Kevin M. Littman, *U.S. Supreme Court Strengthens Patents (for a Change)*, SCIENCE BUS. (June 23, 2016), http://sciencebusiness.net/news/79833/US-Supreme-Court-strengthens-patents-(for-a-change) [https://perma.cc/UCX3-3WUP] (arguing this will raise the value of patents and increase the incentive to sue for infringement).

justified solution will be to legally impose these rights and duties on other parties as the users.

Instead, I would like to suggest an alternative model that, on the one hand, acknowledges and reflects the perception of the 3A era of automated, autonomous, and advanced AI systems, and, on the other hand, imposes control and accountability on traditional legal entities. *This* model would consider AI systems as employees (or contractors) that work for the humans or firms that legally operate them. *This* model is similar to the notion of an "employed creator" under the WMFH doctrine—i.e., an employee who creates new works in the scope of their employment.

The owner of a copyright has the exclusive right and may authorize others to reproduce the work, prepare derivative works based on the work, distribute copies of the work, or show the work publicly. Having those rights also means that the copyright holder has the right to stop others from infringing on those rights. The problem for a non-human, such as an AI system, is that it is unable to enforce those rights. Although it is theoretically feasible, a computer cannot sue another computer in court over the unauthorized copying of its work. Furthermore, a computer is incapable of transferring those rights to others who might be able to sue on its behalf. Even from a public policy perspective, the main purpose of granting copyright protection is to stimulate artistic creation by ensuring that nobody can steal the fruits of an artist's labor, making it less risky to create original works of authorship. Since computers cannot be "encouraged" to create new works, the usual public policy justifications underlying copyright law are inapplicable.

Some would argue that the WMFH model isn't any different from a film director and a cameraman taking particular shots. The cameraman is a creative person, but the director will hold the right to the shot. AI systems act similarly to the creative cameraman. In fact, 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.*"[227] The Court reasoned that, in most cases, in order for a computer to generate any kind of artistic work, it would require significant input from an author or user.[228] Another way to think about it is this: when an artist uses Adobe Illustrator to create a unique graphic design, nobody can deny that the designs were the product of the designer's creative

227. 412 U.S. 546, 561 (1973) (emphasis added).
228. *See id.*

mind. However, creating a song by pressing a button on a random number music generator isn't going to receive copyright protection on the resulting musical composition. But if the user provides some input that affects the song being generated, such as choosing the instruments, deciding on the key or tempo, or choosing a musical style for the composition, then the final musical composition may be the result of creative input and therefore copyrightable.

The law and economics theory, discussed above, is the dominant justification for copyright protection in Anglo-American law.[229] However, in continental Europe, where copyright protection originated with an eye towards protecting great, independent artists, a different approach prevails, as addressed in the next Section.

B. Personality and Labor Theoretical Justifications

In civil law jurisdictions, the dominant justifications for copyright are the personality and labor Lockean theories.[230] The personality theory posits that copyright protection is a right that accrues to the author in possession, reflection, and development of his personality on the assets.[231] It recognizes and appreciates the author's accomplishments and the element of his or her personality and individuality that the work contains, rather than simply an incentive to create more.[232] A related justification is the labor theory, which stipulates that copyright protection exists due to the hard work and dedication that authors contribute to their works.[233] Just as AI does not need to be incentivized, AI systems do not have any need for recognition of the works reflecting their personality.[234] Nevertheless, I argue that copyright protection could still accrue to the creators of such machines.

Developing AI systems capable of creating works of authorship is a great accomplishment. Therefore, it may make sense to grant

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229. *See* Posner, *supra* note 199.

230. *See* MARTIN SENFTLEBEN, COPYRIGHT, LIMITATIONS, AND THE THREE-STEP TEST: AN ANALYSIS OF THE THREE-STEP TEST IN INTERNATIONAL AND EC COPYRIGHT LAW 8 (2004); Justin Hughes, *The Personality Interest of Artists and Inventors in Intellectual Property*, 16 CARDOZO ARTS & ENT. L.J. 81, 83 (1998).

231. *See* Hughes, *supra* note 230, at 83.

232. *See* Margaret Jane Radin, *Property and Personhood*, 34 STAN. L. REV. 957, 986 (1982) (arguing that the more personal one's property is, the more nonfungible and nontransferable it becomes); *see also* Yanisky-Ravid, *supra* note 191, at 9.

233. Yanisky-Ravid, *supra* note 191, at 4-5.

234. *See supra* Part III.

programmers the copyrights of works created by AI systems to recognize the magnitude of that accomplishment. Still, and even more strongly than the analysis of the incentive structure endemic to the law and economic theory, we have no other option than to recognize that when a creator is a machine, robot, or AI system, the personality theory and the labor theory are irrelevant. We therefore cannot justify the existence of copyright laws when they are applied to this new reality. Just as we do not need to incentivize programmers to create works of authorship in which they do not have any creative input, we do not need to recognize a programmer for an artistic accomplishment that is not his or her own. Therefore, there is little support for granting copyright protection to human programmers for the works of their AI systems under this theory either. However, when addressing the Work Made for Hire doctrine, we can rely partially on the labor approach to the investment of the firm in the works produced by the AI systems.[235]

IV. THE MODEL OF AI—WORK MADE FOR HIRE (WMFH)

One major motivation for the proposed model is to unveil the clandestine interests behind the phenomenon of AI systems. Following Professor Jack Balkin, who has explored the "laws of robotics" and the legal and policy principles that should govern how human beings use robots, algorithms, and AI systems,[236] I claim that we should view AI systems as working for the users, and hence the users should bear accountability for the systems' production, in addition to the benefits thereof. Balkin argues that there exists a false belief of a little person inside each robot or program who has either good or bad intentions.[237] According to Balkin, the substitution effect refers to the multiple effects on social power and social relations that arise from the fact that robots, AI systems, and algorithms act as substitutes for human beings and operate as

235. *See, e.g.*, Shlomit Yanisky-Ravid & Amy Mittelman, *Gender Biases in Cyberspace: A Two-Stage Model, the New Arena of Wikipedia and Other Websites*, 26 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 381, 391 (2016) (explaining that investment into information technology can help establish a more free and democratic reality); *see also* Shlomit Yanisky-Ravid, *"For a Mess of Pottage": Incentivizing Creative Employees Toward Improved Competitiveness*, CORNELL HUM. RTS. REV. (2013), http://www.cornellhrreview.org/wp-content/uploads/2013/05/Incentivizing-Creative-Shlomit-Yanisky-Ravid.pdf [https://perma.cc/88MX-T8WM].

236. *See* Balkin, *supra* note 21, at 14.

237. *See id.* at 13-14.

special-purpose people.[238] For Balkin, the most important issues in the laws of robotics require an understanding of how human beings exercise power over other human beings mediated through new technologies.[239] The "three laws of robotics" should therefore be laws directed at human beings and human organizations, not at the robots or AI systems. According to Professor Balkin, those basic laws that regulate and control robots and AI systems include the following: (1) operators of robots, algorithms, and AI systems are information fiduciaries who have special duties of good faith and fair dealing toward their end-users, clients, and customers; (2) privately owned businesses who are not information fiduciaries nevertheless have duties toward the general public.[240] I further argue that identifying the many players behind AI systems is the key factor for imposing accountability for the works generated by AI systems. Following Balkin's argument, I propose a new model that might delegitimize the use of new technologies as a means for both public and private organizations to govern large populations. In order to unveil these hidden powers, I propose a model that sees AI systems as independent workers or employees of the users.

A. Rethinking the WMFH Legal Doctrine in the Case of AI Systems

The WMFH doctrine gives employers, or the individual commissioning the work, the copyright in works of authorship created by the employees or subcontractors.[241] The WMFH rule is thus an exception to the general principle of copyright ownership. Usually, the copyright becomes the property of the author once the creation meets the demands of the law.[242] However, if a work is made

238. *See id.* at 14.

239. *See id.* at 16.

240. *See id.* at 19-23 (arguing that those who use robots, algorithms, and AI systems have a public duty to avoid creating nuisances. Thus, for example, businesses may not leverage asymmetries of information, monitoring capacity, and computational power to externalize the costs of their activities onto the general public).

241. 17 U.S.C. §§ 101, 201 (2010); Cmty. for Creative Non-Violence v. Reid, 490 U.S. 730, 746 (1989); *Works Made For Hire*, U.S. COPYRIGHT OFF., https://www.copyright.gov/circs/circ09.pdf [https://perma.cc/PTA4-X44R] (last visited Jan. 15, 2018).

242. § 102 ("Subject Matter of Copyright (a) Copyright protection subsists, in accordance with this title, in original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device. Works of authorship include the following categories: (1)

for hire, the employer or the one who commissioned the work would be considered the author, even if an employee or subcontractor actually created the work. The employer could be a firm, an organization, or an individual.[243]

Section 101 of the Copyright Act defines a "work made for hire" in two parts:

> (1) a work prepared by an employee within the scope of his or her employment; or
>
> (2) a work specially ordered or commissioned for use as a contribution to a collective work, as a part of a motion picture or other audiovisual work, as a translation, as a supplementary work, as a compilation, as an instructional text, as a test, as answer material for a test, or as an atlas, if the parties expressly agree in a written instrument signed by them that the work shall be considered a work made for hire.[244]

This section should be read together with Section 201 of the same Act:

> (a) Initial Ownership.
>
> Copyright in a work protected under this title vests initially in the author or authors of the work. The authors of a joint work are coowners of copyright in the work.
>
> (b) Works Made for Hire.
>
> In the case of a work made for hire, the employer or other person for whom the work was prepared is considered the author for purposes of this title, and, unless the parties have expressly agreed otherwise in a written instrument signed by them, owns all of the rights comprised in the copyright.[245]

The Supreme Court's decision in *Community for Creative Non-Violence v. Reed* addressed the "work made for hire" definition.[246]

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literary works; (2) musical works, including any accompanying words; (3) dramatic works, including any accompanying music; (4) pantomimes and choreographic works; (5) pictorial, graphic, and sculptural works; (6) motion pictures and other audiovisual works; (7) sound recordings; and (8) architectural works. (b) In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work.").

243. *See Works Made for Hire*, *supra* note 241, at 2 ("If a work is made for hire, the employer or other person for whom the work was prepared is the initial owner of the copyright unless both parties involved have signed a written agreement to the contrary.").

244. § 101.

245. § 201.

246. *Cmty. for Creative Non-Violence*, 490 U.S. at 737.

"The Court held that one must first ascertain whether a work was prepared by an employee or an independent contractor."[247] "If an employee created the work . . . the work will generally be considered a work made for hire."[248] In this context, however, the term *employee* differs from its common understanding.[249] "For copyright purposes, 'employee' means an employee under the general common law of agency."[250] "An independent contractor," on the other hand, "is someone who is not an employee under the general common law of agency."[251] "If an independent contractor created the work, and the work was specially ordered or commissioned," the second part of the WMFH definition applies.[252] "A work created by an independent contractor can be a work made for hire only if (a) it falls within one of the nine categories of works listed . . . above, *and* (b) there is a written agreement between the parties specifying that the work is a work made for hire."[253]

To help determine who is an employee, the Court identified factors that establish an "employer–employee" relationship, as defined by agency law.[254] The factors fall into three broad categories:

> (1) control by the employer over the work (i.e., the employer determines how the work is done, has the work done at the employer's location, and provides the . . . means to create the work); (2) control by the employer over the employee (i.e., the employer controls the employee's [time] in creating the work, has the right to have the employee perform other assignments . . . or has the right to hire the employee's assistants); and (3) status and conduct of the employer (i.e., the employer is in business to produce such works [or] provides the employee with benefits).[255]

"These factors are not exhaustive[,] [and] [t]he Court left unclear which of these factors must be present in order to establish the employment relationship under the work-for-hire definition."[256]

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247. *See id.* at 731; *Works Made for Hire*, *supra* note 241, at 2.

248. *See Cmty. for Creative Non-Violence*, 490 U.S. at 732; *see also Works Made for Hire*, *supra* note 241, at 2.

249. *See Works Made for Hire*, *supra* note 241, at 2.

250. *See id.*

251. *See id.*

252. *See id.*

253. *See id.*

254. *See id.*

255. *See* Cmty. for Creative Non-Violence v. Reid, 490 U.S. 730, 751-52 (1989); *see also Works Made for Hire*, *supra* note 241, at 2.

256. *See* 17 U.S.C. §§ 101, 201 (2012); *Community for Creative Non-Violence*, 490 U.S. at 751-52.; *Works Made for Hire*, *supra* note 241, at 2.

> Examples of works made in an [employer–employee] relationship include: [a] software program created by a staff programmer within the scope of his or her duties at a software firm[;] [a] newspaper article written by a staff journalist for publication in the newspaper that employs the journalist . . . [;] [a] musical arrangement written for a music company by a salaried arranger on the company's staff[;] [and] [a] sound recording created by the salaried staff engineers of a record company.[257]

Why it is important to identify WMFH? There are important consequences that stem from the WMFH doctrine, including that the term and duration of copyright protection differ, there are no moral rights, and the termination provisions of the law do not apply.[258]

B. WMFH and Works Generated by AI Systems

This doctrine is an important and major exception to the general rule that copyright protection properly rests with the one or the many who actually created the work.[259] It is therefore important for cases of AI systems generating works.[260] The Copyright Act named the employer and main contractor as the authors of the work even though they have not actually created the work.[261] The policy rationale for this doctrine is to incentivize the employer or primary contractor at whose instance, direction, use, commercial purposes or risk the work is prepared, as well as to give them control over the commercial force regarding the work.[262] The idea and the outcome is that the employer or primary contractor, rather than the creator (who is an employee or sub-contractor), has the responsibility for and the accountability over the actions of the creator in regards to, inter alia,

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257. *See Works Made for Hire*, *supra* note 241, at 2.

258. §§ 101, 106A, 302(a), 302(c), 304(a), 203(a). For example, WMFH copyright protection of a work made for hire is ninety-five years from the date of publication or 120 years from the date of creation, whichever expires first, whereas a work not made for hire is ordinarily protected by copyright for the life of the author plus seventy years. *See id.* § 302.

259. *See* § 201(a).

260. *See* Catherine L. Fisk, *Removing the 'Fuel of Interests' from the 'Fire of Genius': Law and the Employee-Inventor, 1830-1930*, 65 U. CHI. L. REV. 1127, 1131 (1998) (arguing that employees efficiently transfer their rights in future products to their employers through their employment contracts).

261. *See* § 201(b).

262. Cmty. for Creative Non-Violence v. Reid, 490 U.S. 730, 746 (1989); Fisk, *supra* note 260. For a critique of this approach, see Shlomit Yanisky-Ravid, *Rethinking Innovation and Productivity Within the Workplace Amidst Economic Uncertainty*, 24 FORDHAM INTELL. PROP., MEDIA & ENT. L.J. 143, 173-79 (2013) (rethinking innovation by incentivizing employees), and Yanisky-Ravid, *supra* note 235, at 3.

infringements of the law and harm caused by the work.[263] This rule may be altered or changed by a contract among the relevant parties.

I claim that this doctrine seems to fit well conceptually with the problem of works created by AI systems. Although the AI system itself would be the proximate creator of the work, others, such as the user of the AI system at whose instance the work is ultimately created, will be entitled to ownership as well as accountability in regard to the works. But in the case of AI systems, who is the employer or main contractor? The answer may be complicated and may vary according to different circumstances. In many cases, it will be the user that operates and provides directions to the machine in the form of instructing it what to paint, write about, etc. The answer may also be the user that takes the financial risk of buying or hiring the machine and supplying it with energy and materials in the hope of producing a marketable final product. From a policy and practical standpoint, it makes sense to incentivize people or firms as well as other entities to use creative AI systems to create works of authorship because doing so will most efficiently promote the proliferation of the devices and the works they produce.[264]

The justification for giving the entitlement of ownership to economic entities is rooted in the incentive theory as well.[265] This legally sanctioned monopoly allows the users to use, sell, or distribute the works more efficiently, as well as to be accountable for avoiding infringements and counterfeits.[266] The latter is perhaps a better argument for giving copyright protection in the works of advanced, autonomous AI systems to their users. To avoid AI systems getting out of control, we have to legally nominate the most efficient entity to control them. The incentive for imposing property accountability on the users as employers or main contractors and seeing AI systems as employees or subcontractors is not just intuitive, it is also justified by theoretical and practical reasoning. The user can also be the owner of the AI system when the owner is the more efficient entity for controlling these works.

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263. 35 U.S.C. §§ 101, 102 (2012); Fisk, *supra* note 260, at 1131.

264. *See* Yanisky-Ravid, *supra* note 235, at 3.

265. Kendra Cherry, *The Incentive Theory of Motivation: Are Actions Motivated by a Desire for Rewards*, VERY WELL (May 9, 2016), https://www.verywell.com/the-incentive-theory-of-motivation-2795382 [https://perma.cc/3JN7-P24S].

266. Paul Belleflamme, *The Economics of Copyright Protection*, IPDIGIT (Oct. 2, 2013), http://www.ipdigit.eu/2013/10/the-economics-of-copyright-protection [https://perma.cc/MGQ3-6QNW].

This model also solves the inherent problem of multiple players being involved in the development of AI systems. The tragedy of multiple stakeholders is that they can block the development and commercial use of the AI system.[267] Moreover, the model would encourage further investment in the AI industry and likely promote science and technology, thus promoting the goals of the Constitution and promoting total welfare. With respect to AI systems, the innovation provided by this model does not just grant rights and benefits, such as ownership of the products, it also imposes responsibility and thus assists in solving the problem of the lack of accountability for the outcomes of AI systems. This mechanism might also contribute to the responsibility and accountability for the use of AI systems in other regimes, such as criminal law and tort law. One could argue that these fields are based on a different justification and, therefore, are not influenced by the copyright regime. However, I claim that, because AI systems are copyrightable based on their software, it may be justified and useful to implement this model within the intellectual property realm as it intersects with other legal fields, such as tort and criminal law, that address the same challenges, including lack of accountability for damages generated by autonomous car accidents caused by AI systems.

Under this model, we see the AI systems as creative employees or subcontractors (just like humans) working for these entities. The model works for both firms and humans: The autonomous AI system, just like WMFH-employed creators, is the creative author of a work. When an AI system acts autonomously, it can be compared to an independent contractor and thus be shielded under WMFH doctrine.

C. The Legal Implications of the AI WMFH Model

Who owns the copyright in regard to the works generated by an AI system? Who is responsible for any damage the works may cause? Who would be the most efficient player in distributing and selling the works? Take, for example, The Next Rembrandt project. Unlike a traditional computer program, The Next Rembrandt project had teams of people working for several years to bring it to the public. What happens to those individuals? Do all of the people involved with the project have copyright ownership of its artworks?

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267. Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621, 621-24 (1998).

Are they all, or perhaps only some of them, entitled to joint copyright ownership? Trying to determine the scope of ownership amongst the team members would be extremely difficult. In fact, this multi-stakeholders challenge was one of the practical and theoretical issues that led to the original WMFH doctrine.

On some level, the AI WMFH doctrine can solve this problem. It holds that the person or entity that orders or initiates the work is entitled to the copyright, instead of the authors themselves. Based on this theory, before the AI system was generated, the employer or the main contractor may be entitled to all of the rights. However, does this mean that the employer or the main contractor, under certain circumstances, is also entitled to the right over the paintings generated by the AI system? If this were the case, for example, the entity that operates The Next Rembrandt project, ING, would receive the full copyright over the paintings being generated by the system, as soon as certain legal requirements were met.[268] Thus, it is possible that there is a copyright in The Next Rembrandt and that the copyright is held by ING. Copyright protection is only important if ING wants to enforce it, and applying the WMFH doctrine in a case like this would have some drawbacks.

D. The Drawbacks of Adopting the WMFH Model in Cases of AI Systems

Many questions arise in implementing the existing WMFH doctrine. Are the works generated by AI systems copyrightable in the first place? If these works are not copyrightable, can the employer hold copyright through the WMFH doctrine? What happens if the works generated by AI systems are not included in the nine-item list

268. The requirements being: (1) A written agreement signed by both parties (2) that specifically states that the work is a "work-made-for-hire" and (3) the work must be one of these nine types: a contribution to a collective work, part of a motion picture or other audiovisual work; a translation; a supplementary work; a compilation; an instructional text; a test; material for a test; or an atlas. Generally, in order for the WMFH doctrine to apply when many individuals are involved in producing a work, the entity entitled to copyright ownership must sign a contract with each team member attesting that each team member's contribution is a work made for hire. The type of work must also be included in the list of products covered by the WMFH doctrine. An argument could be made that The Next Rembrandt might fall under the category of "compilation," or perhaps a "contribution to a collective work." Additionally, it is very likely that ING, with potential copyright claims to the work, had to affirmatively relinquish any claims prior to starting work on the project.

of the copyright law? What happens when autonomous AI systems create a work outside the scope of "employment"? What would be the legal outcome in another jurisdiction, such as France, where the creative employees retain the rights themselves? What would be the outcome when the AI system generates products or actions that are not copyrightable?

The Supreme Court has suggested that the WMFH doctrine is very limited in scope—namely, it applies only to instances where Congress has expressed a clear and explicit intent to override section 102.[269] Therefore, implementing the doctrine would require new legislation with a broader scope of the matters and the rights involved. By comparison, denying copyright to works produced by advanced AI systems would probably require judicial clarification, as such a result is theoretically compatible with the current legal framework.

Furthermore, the AI context is less germane to the Work Made for Hire analysis than a corporation, like a publishing company or record label. When addressing the works produced by AI systems, there are no human creators behind such production.[270] The employed creators produce the protected works within the scope of their employment.[271] These employees work for the employer mainly for the purpose of creating a work, with major contributions, guidelines, and involvement from the employer.[272] The policy rationale for giving rights to these types of corporations is to justify the (often large) upfront costs entailed in developing artistic talent and slowly producing a work while balancing the needs of the artist with the needs of the corporation's marketing strategy. However, the costs accruing to a user of creative AI would be much lower. For example, while a record company needs to scout and find talent, create a "brand" strategy for a musical act, allow the artist or artists to write and record music over several months, operate a music studio, and employ sound engineers to bring everything together in a

269. *See* Cmty. for Creative Non-Violence v. Reid, 490 U.S. 730, 747 (1989).

270. *See supra* Section I.A.

271. Karthik Raman, *Protecting Intellectual Property Rights Through Information Policy*, UBIQUITY (June 2004), http://ubiquity.acm.org/article.cfm?id=1008537 [https://perma.cc/Z5PF-6BJ4].

272. *Employment Relations Research Series 123*, DEP'T BUS. INNOVATION & SKILLS (Mar. 2013), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/128792/13-638-employer-perceptions-and-the-impact-of-employment-regulation.pdf [https://perma.cc/ANR8-3K9L].

finished song, the user of the kind of AI system discussed in this Article needs only buy the machine and supply it with materials. The machine can then create works non-stop, without needing to be compensated. Because the costs of undertaking the activity are relatively low, it may not make sense to create a new legal framework just to incentivize owners of creative AI systems. Therefore, some academics and practitioners argue that it might make more sense to adopt the personhood and rights of AI systems even if the "price" is simply refusing copyright protection.[273] However, the model that I propose is broader than the WMFH doctrine and establishes a spectrum that might include all works produced by AI systems.

E. The Advantages of the Proposed AI WMFH Model

In this model, users are understood to be the owners of works generated by AI systems. As such, they are also considered to be responsible for such works. In this section, I discuss several benefits of this model, especially when compared to the alternatives.

First, the model reflects an understanding of the human-like features of AI systems, instead of ignoring them as current legal regimes do when they look for the human behind the system. The model refers to an AI system as both creative and independent and imposes the same set of rules and principles that regulate creative works produced by humans acting as self-contractors or during employment by others.

Second, the model is justified by the law and economics theory, which incentivizes the efficient use of the creative, autonomous AI systems and enhances the commercial force of the works generated by them.

Third, and most importantly, instead of implementing scenario A or B, which would hold programmers and other players to be the owners of the AI systems and entrust them with responsibility for the works generated, this model solves the accountability gap. The AI WMFH model is the best solution for the problem posed by the accountability gap because it places responsibility on the users as employers or main contractors of the AI systems. Seeing AI systems

273. *See generally* Cohen, *supra* note 2; Yanisky-Ravid & Liu, *supra* note 38 (suggesting an alternative model to patent law in case of AI systems generating inventions).

as employed creators or independent contractors allows the legal system to control AI systems' outcomes.

Fourth, instead of totally nullifying copyright laws as irrelevant and outdated, the AI WMFH model amends and accommodates parts of the existing doctrine. As a result, it better maintains legal and social stability.

Fifth, imposing accountability on users will encourage the careful operation of AI systems to avoid damages, infringements, and counterfeiting of third parties' rights. The model identifies ownership as the main benefit of accountability. In this way, the model ensures the AI systems do not get out of control.

The users can be firms, individuals, states, governmental bodies, and more. The model is flexible. The accountability can be changed according to the specific circumstances. For example, damages caused by AI systems and actions or omissions of AI systems can be causally linked to other stockholders.

Implementing the AI WMFH model will require new legislation or adjusting the traditional laws, as current copyright laws are insufficient to deal with the advanced technology revolution. The model requires a fundamentally new component: recognition that works generated by AI systems are copyrightable even though they are not created by humans.

The United States is not the only nation to have considered the effects that AI will have on copyright laws. Whereas U.S. law has faced some impediments towards establishing copyright protection for works created by AI, other countries have already taken preemptive steps towards clarifying this issue. For example, the United Kingdom took a stance with its 1988 Copyright, Designs, and Patent Act.[274] The Act declares that human authorship is irrelevant to whether a work is copyrightable and that copyright in a work not authored by a human lies with the person who is responsible for the computer's creation.[275] Around the same time, the European Community considered the issue and applied an approach similar to CONTU's. According to the European Community, since computers

274. Robert C. Bird & Lucille M. Ponte, *Protecting Moral Rights in the United States and the United Kingdom: Challenges and Opportunities Under the U.K.'s New Performances Regulations*, 24 B.U. INT'L L.J. 213, 238 (2006); Miller, *supra* note 54, at 1052 (arguing that existing case law contains no persuasive objection to extending copyright protection to works crated without a human author and that such an extension would fulfill the constitutional imperative of promoting progress in these areas).

275. Miller, *supra* note 54, at 1052.

are currently the tool of human authors, the default approach to computer-generated works is to apply copyright protection.[276] Although Europe had the added, thorny issue of moral rights, the result was ultimately the same as that adopted in the United States.[277] Recently, the European approach has shifted more toward recognizing robots and AI systems as autonomous entities. One of the best examples of this approach is the draft proposal to impose tax payments on robots.[278] The World Intellectual Property Organization (WIPO) also discussed works produced by AI systems during the drafting of a proposed model copyright law and ultimately adopted a similar position as the European Community.[279] More recently, Australian law has considered this issue in the context of deciding whether or not a copyrightable work must have a human author.[280] Several Australian judgments seem to indicate that human authorship is required.[281]

V. U.S. COPYRIGHT LAW IS UNPREPARED TO DEAL WITH AI SYSTEMS

A. Humans vs. AI Systems as Creators

The most significant hurdle to obtaining copyright control and accountability for a work generated by an AI system is the principle of human authorship.[282] It is not clear whether the U.S. Copyright

276. *Id.* at 1050.

277. *Id.* at 1049-50.

278. *See* Weller, *supra* note 122.

279. Michael L. Doane, *TRIPS and International Intellectual Property in an Age of Advancing Technology*, 9 AM. U. J. INT'L L. & POL'Y 465, 489, 497 (1994) (arguing that the TRIPS Agreements, even without suggested improvements, "marks significant progress in the quest for international intellectual property protection" by "balancing the demands of the industrialized nations for international intellectual property protection" and providing an "improved dispute resolution system with the interest of developing countries in achieving an agreement on agricultural and textile issues").

280. Jani McCutcheon, *The Vanishing Author in Computer-Generated Works: A Critical Analysis of Recent Australian Case Law*, 36 MELBOURNE U. L. REV. 915, 938-40 (2012) (critiquing the application of conventional notions of human authorship to modern productions and suggesting alternative approaches to authorship that satisfy both the major objectives of copyright policy and the need to adapt to the computer age).

281. *Id.* at 939-40.

282. MELVILLE B. NIMMER & DAVID NIMMER, NIMMER ON COPYRIGHT § 2.01 (2008); *see also* Rebecca Haas, *Twitter: New Challenges to Copyright Law in the*

Act itself explicitly requires the author of a creative work to be a human.[283] However, the U.S. Copyright Office, by publishing "The Compendium II of Copyright Practices," has gone beyond the statutory text to require that an author be human in order for the work to be eligible for copyright protection.[284] Although the Compendium is an internal document without the force of law,[285] it reveals the attitudes of the Copyright Office and presents a significant hurdle for humans seeking to claim copyright protection in works not directly authored by them.

Consequently, integrating works produced by AI into the copyright regime will require at least the disturbance of settled Copyright Office practice. One must also determine whether that is the only hurdle that exists. For example, proponents of giving copyright protection to human users of AI-artists might look to *Urantia Foundation v. Maaherra* for support.[286] In this Ninth Circuit case regarding the copyright of a holy text supposedly authored by "celestial beings," the court mentioned, in dicta, that the Copyright Act does not explicitly "require human authorship."[287] However, the case can also be interpreted as lending support for the idea that the statute really does not protect works authored by non-humans. For instance, the court muses, again in dicta, that "it is not creations of divine beings that the copyright laws were intended to protect."[288] Furthermore, the court required that "some element of human creativity must have occurred in order for the Book to be copyrightable."[289] In that case, the court determined that the requisite instance of human creativity was the compilation of the beings' diverse revelations into a single volume.[290]

The works of current-generation AI systems, like e-David, are probably copyrightable because there is a connection between the creative elements and the users, such as the feedback supplied by

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Internet Age, 10 J. MARSHALL REV. INTELL. PROP. L. 231, 247-48 (2010); Yanisky-Ravid & Velez-Hernandez, *supra* note 32, at 19.

283. *See* 17 U.S.C. § 102 (1990); Urantia Found. v. Maaherra, 114 F.3d 955, 958 (9th Cir. 1997) (explaining that copyright laws do not mandate humans to author the work).

284. THE COMPENDIUM II OF COPYRIGHT PRACTICES § 202.02(b) (COPYRIGHT OFFICE 1998).

285. *Id.* § 1902.07.

286. *See Urantia Found.*, 114 F.3d at 957.

287. *Id.* at 958.

288. *Id.*

289. *Id.*

290. *See id.*

human trainers or the programming of a desired goal. But works created by totally autonomous AI systems, like an advanced neural network, probably do not meet the *Maaherra* standard, unless the human in question were to somehow alter the works, such as by compiling them together. Although that might be a sufficient remedy for owners of creative AIs, it does not foreclose the possibility that a single work, taken as it is, will not be copyrightable. To avoid this outcome, I suggest the adoption of the WMFH doctrine for AI systems, which considers the system to be the creative employee or creative independent contractor, thus entitling the rights to another entity to be responsible for the outcomes of the AI system.

B. Eligibility for Copyright Matters

Before determining the place artworks created by AI systems *should* have in our copyright laws, it is important to explore what place they *presently* occupy. Ultimately, all copyright protection in the United States is derived from, or at least related to, the Copyright Clause of the Constitution.[291] The Copyright Act, which is Congress' implementation of that constitutional grant of power, provides that "[c]opyright protection subsists, in accordance with this title, in original works of authorship fixed in any tangible medium of expression."[292] The Supreme Court's formulation is that "[t]o qualify for copyright protection, a work must be original to the author" and possess "at least some minimal degree of creativity."[293]

The creator of a traditional work of art receives copyright protection automatically, as soon as the work is "put to paper."[294] New systems, like The Next Rembrandt, do not have a single artist.[295] In such instances, the work itself was created by a digital,

291. *See* U.S. CONST. art. I, § 8, cl. 8.

292. 17 U.S.C. § 102 (1990) (stating that copyright protection exists for any original works of authorship, in any tangible medium of expression, "from which they can be perceived, reproduced, or otherwise communicated," and lists several categories of works of authorship, including literary works, musical works, and dramatic works, among others).

293. Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 345, 363-64 (1991) (holding that information without original creativity is not protected by copyright).

294. *See* § 102.

295. *See* Ann Bartow, *Copyright and Creative Copying*, 1 U. OTTAWA L. & T. J. 75, 96 (2004) (arguing that in the US copying style is not generally considered copyright infringement).

rather than a human, creator.[296] Can the computer or the computer's owner assert a copyright?

To answer this question, one must apply the rules laid out in the Copyright Act. One must first determine whether computer-generated art fulfills the basic requirements necessary to receive copyright protection.[297] Copyright protection is currently available for (1) an original work of authorship, (2) fixed in a tangible medium, (3) that has a minimal amount of creativity.[298] If a work does not meet all three of these requirements, then it is not copyrightable subject matter.[299]

1. *Originality*

An original work is one that is new or novel, and not a reproduction, clone, forgery, or derivative work.[300] An original work stands out because it was not copied from the work of others.[301] In another article, I have discussed the requirement of originality for works generated by AI systems.[302] In that piece, I concluded that the formal approach to originality is preferred to the subjective approach and is applicable to works generated by AI systems.[303] For example, at first glance, some may think that a work produced by The Next Rembrandt is an original Rembrandt. However, the AI system generated a new painting without copying any existing work even though it did copy the style of the original painter.[304] Thus, as a unique image, it is likely that a work produced by The Next Rembrandt is an original work.

296. *See* SIMON STOKES, ART AND COPYRIGHT 7 (2012).
297. *See* § 102.
298. *See id.*
299. *See id.*
300. *See id.*
301. *See id.*
302. *See* Yanisky-Ravid & Velez-Hernandez, *supra* note 32, at 2.
303. *See id.* at 53-56.
304. *See* STOKES, *supra* note 296, at 6; Bartow, *supra* note 295, at 96 (arguing that in the U.S. copying style is not generally considered copyright infringement).

2. *Fixed in a Tangible Medium*

The second requirement for copyright protection is the notion that an artwork must be "fixed in a tangible medium."[305] This means that the artwork must be more than just an idea in someone's head.[306]

> To be copyrightable, the work must have a tangible physical representation. Ideas are thus not copyrightable[;] only the execution or expression of those ideas [are copyrightable], which usually occurs once words are written on a page, paint is placed on a canvas, doodles [are] drawn on a napkin, or even an image [is] captured by the digital sensor of a camera or copied to a disk or cloud drive.[307]

In this case, the work produced by The Next Rembrandt is a physical painting, which is clearly a tangible medium, and thus it satisfies the second requirement.

3. *Creativity*

Even if a human inventor or user is not foreclosed from copyright ownership in the product of a creative AI system simply because the author is not human, there is still another hurdle to jump. The Supreme Court has ruled that, in order for copyright to apply to a work, there must be "at least some minimal degree of creativity" involved.[308] Conceptually, we have to ask if the "creativity" of an AI system is really what the Supreme Court meant was required. It is widely recognized that the standard of creativity is extremely low.[309] In *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, the Second Circuit held that "[a] copyist's bad eyesight or defective musculature, or a shock caused by a clap of thunder, may yield sufficiently distinguishable variations."[310] In the famous case of *Feist Publications Inc. v. Rural Telephone Service Co.*, the Supreme Court made it clear that, although the standard of creativity is low, it is not

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305. *See* Yanisky Ravid & Velez-Hernandez, *supra* note 32, at 12 n.38.

306. *See id.* (explaining that to satisfy the second requirement, the work cannot just be "an idea in someone's head").

307. *See id.*

308. Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 345, 363-64 (1991) (holding that information without original creativity is not protected by copyright).

309. *See id.* at 345.

310. 191 F.2d 99, 105 (2d Cir. 1951) (holding that in action for infringement of copyright, the eight mezzotint engravings were sufficiently different from the paintings which they purported to have copied and were thus entitled to copyright protections).

non-existent.[311] In that case, the Court found that a telephone directory was not copyrightable because it was nothing more than a compendium of facts, arranged in a commonsense way that revealed no creative input on the part of the creators.[312] On cursory inspection, *Feist* may not appear to square directly with *Catalda*. If *Catalda* stands for the proposition that anything, no matter how miniscule or inadvertent, that sets something apart from other works can supply the requisite creativity, *Feist* seems to say that something more is required. Although the phonebook was not identical to any other existing work, it was still not subject to copyright protection due to a lack of creativity.[313]

Indeed, much critical scholarship has been devoted to the proposition that *Feist* strengthened the creativity requirement. Prior to *Feist*, the copyright standards appeared to require little more than independent effort, and almost certainly did not require creativity.[314] Those scholars posit that *Feist* is a reformulation, and almost certainly a tightening, of copyright restrictions.[315] Indeed, Congress had earlier stated that the "standard of originality does not include requirements of novelty, ingenuity, or esthetic [sic] merit, and there is no intention to enlarge the standard of copyright protection to require them."[316] Furthermore, the Register of Copyrights had been forced to abandon a standard that included a requirement that copyrightable works "must represent an appreciable amount of creative authorship."[317] But the *Feist* Court nevertheless held that their dual formulation of creativity and originality was constitutionally mandated.[318] So, if creativity is logically distinct

311. *Feist Publ'ns, Inc.*, 499 U.S. at 345.

312. *See id.* at 362.

313. *See id.*

314. Howard B. Abrams, *Originality and Creativity in Copyright Law*, 55 LAW & CONTEMP. PROBS. 3, 44 (1992) (arguing that the principle demonstrated by Feist is sound both doctrinally and in practice by "insisting that the constitutional requirement of authorship embodied in the standard of originality have some meaningful minimum").

315. *Id.* at 5.

316. *Id.* at 15 (quoting HR 1476 at 51; S. REP. NO. 473 at 50).

317. *See id.* (quoting Report of the Register of Copyrights on the General Revision of the U.S. Copyright Law, H. Comm. on the Judiciary, 87th Cong., 1st Sess. 9 (Comm. Print, 1961)) (recommending that the statue should hold that works must be tangible and "the product of original creative authorship" to be copyrightable, and "that these requirements apply to new versions of preexisting works").

318. *Feist Publ'ns*, *Inc.*, 499 U.S. at 347-48; *cf.* Abrams, *supra* note 314, at 14.

from originality, then the mere fact that an AI system's works may be different from any that came before them will not be enough to secure copyright protection, either for the machine itself or for the owner of it.[319] A court would have to determine that some creativity was involved in order for copyright to attach.[320]

It is difficult to pinpoint where exactly the element of creativity lies within a work created by a machine. It is a somewhat easier question with quasi-AI systems, like e-David, since the creators of such systems need to directly program all of the machine's "creative" faculties. But with a hypothetical "learning" AI system, like a neural network, any creative output would be the result of a complex series of weights and calculations that human programmers can neither create nor understand. While it is obvious that such works can be "original," in that they would not be identical to any other works, it is uncertain whether the creativity requirement adds anything more to the analysis. It may be that the process by which an AI system creates an original work is not "creativity," which, as a term, has not been thoroughly explained by the Court. It may be that the distinction the Court made in *Feist* is little more than an attempt to prevent copyright from keeping compilations of plain facts out of public dissemination simply because they are not exactly the same as any other compilation.[321] But it may just as well be the case that the creativity standard the Court articulated in *Feist* requires that innate, hard-to-define aesthetic sensibility that is, particular to living creatures. Such a definition of creativity presupposes an understanding of the concepts that are the subjects of a work. Even with advanced neural networks, it is difficult to foresee that such an understanding within AI systems would be possible anytime soon. Even if a machine could create a unique rendering of a subject, it is very unlikely that AI system would understand what that subject is. It thus lacks the type of internal comprehension that is generally reflected in the works of a human artist when they try to represent something more than the words on the page or the paint on the canvas.

The conclusion is that advanced technology systems, such as AI, which are capable of creating independent, creative, and original works, render the existing copyright regime unworkable. I have grounded the claim by discussing a few basic institutions within

319. *See* Abrams, *supra* note 314, at 42.
320. *See id.*
321. *See id.* at 44.

copyright discourse that cannot be applied in the same way to machines as they can to humans. Based on this discussion, I have concluded that current U.S. legal doctrine on the subject of copyright for the works of AI is anything but clear. I have argued that there is no settled law on the matter. Further support for the notion that copyright should not subsist in works created by AI systems derives from the analysis of the goals of copyright law and the way in which the theoretical justifications for copyright protection interact with works created by AI systems. Therefore, I support amending the copyright laws and adding the tenth missing category—namely, the WMFH model that sees AI systems as independent contractors or employees and thus imposes ownership and accountability in regard to the works on the human users of such machines.

CONCLUSION

As the pace of digital advanced technology continues to accelerate and computers begin to achieve digital tools that I formerly thought impossible, many fields are beginning to feel pressure. For example, in the auto industry, once one of America's largest employers of factory workers, advanced robots are replacing humans in more and more aspects of the production process. These economic pressures are well known, but few have considered what the effects of advanced computers may be on the arts. Creativity, at least at the level necessary to produce works of authorship, is considered to be a uniquely human attribute. But, more and more, that presumption is being put to the test. Advanced AI systems like the robot, Ava, in the movie Ex Machina are already challenging our preconceived notions about the creative process itself. And this is just the beginning. So far, copyright law exists as long as there is still a human, or a team of humans, behind the art that these computers produce. However, the reality has entirely changed as AI systems have become able to create independently.

The technology has continued its forward march. Already, computer scientists have conceived of a machine capable of learning on its own and creating a work of authorship without a human supplying all the creativity. Consequently, copyright law needs to be changed or re-evaluated in order to determine how laws should address these AI systems, the products they produce, and the challenges they pose for the existing copyright regime. Policymakers have to create new moral boundaries for these systems in order to

avoid harm by imposing control of, and accountability for, AI-generated works on recognized legal entities.[322]

The moment we understand how AI systems work, we realize that copyright laws are unprepared and irrelevant for AI systems. AI systems simply do not fit into the existing framework. In the United States and Europe, the traditional solution has been to look for the human behind the creative process, even when he or she does not exist, but this solution is untenable in the long run.

United States law does not speak on this subject directly. But certain legal doctrines exist that may act as impediments to granting copyright protection to works authored by machines. Therefore, it seems unlikely that the programmer, as one who has the rights to the AI system but is removed from the creative process of the independent, unpredictable AI system, will be responsible for the works generated by the system. Furthermore, it is unlikely that a work authored independently by a machine could be granted copyright protection for itself, as such a result would leave humans out of control and betray the justification on which the entire copyright regime is based. It is still possible to change the legal framework to accommodate these works, such as by implementing a new AI WMFH model, as I have proposed. This model can solve the accountability gap in regard to copyright law and even beyond the intellectual property arena.

322. *Isaac Asimov's "Three Laws of Robotics*," AUBURN, http://www.auburn.edu/~vestmon/robotics.html [https://perma.cc/J3RJ-JW8W] (last visited Jan. 15, 2018) (stating the Third Rule of Robotics: "A robot must protect its own existence").