

# O.K. COMPUTER: THE DEVOLUTION OF HUMAN CREATIVITY AND GRANTING MUSICAL COPYRIGHTS TO ARTIFICIALLY INTELLIGENT JOINT AUTHORS

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## INTRODUCTION

On a cold night in late January 2018, Bruno Mars, the celebrated Hawaiian songsmith, swept the top prize for all six of his Grammy nominations.<sup>1</sup> Among those prizes was the win for Song of the Year for the chart-topping hit, “That’s What I Like.” Mr. Mars accepted the award not alone but with his seven other co-writers.<sup>2</sup> This entourage style acceptance is not unusual but instead represents the new norm for songwriting.<sup>3</sup> But what if Mr. Mars replaced the seven songwriters who accompanied him to save costs?<sup>4</sup> And not by other humans—but by a songwriting robot.<sup>5</sup> The Recording Academy, which hosts the Grammy Awards, requires nominated songs to be original works of authorship.<sup>6</sup> If a robot helped, could Mr. Mars have even been nominated?

This debate is nothing new. Legal scholars’ consideration of authorship for compositions made by Artificial Intelligence (AI) dates back to at least 1965.<sup>7</sup> And the same conclusion has repeatedly been reached: granting AIs copyrights is too speculative to consider seriously.<sup>8</sup> But the time is now ripe. Today, AI composers, such as AMPER,<sup>9</sup> independently compose music.<sup>10</sup> But AMPER cannot be an

<sup>1</sup> Ben Sisario, *Bruno Mars Sweeps Top Prizes at the 2018 Grammy Awards*, N.Y. TIMES (Jan. 28, 2018), <https://www.nytimes.com/2018/01/28/arts/music/grammy-awards.html>.

<sup>2</sup> *Id.*

<sup>3</sup> *Id.* (“Accepting the award, Mr. Mars was surrounded by what looked like an entourage, but they were the credited writers of the song, reflecting the new production model of pop music in which huge teams of specialized writers collaborate.”).

<sup>4</sup> In 2011, NPR estimated the cost per songwriter for a single hit song to be \$15,000. See Zoe Chace, *How Much Does it Cost to Make a Hit Song?*, NPR: PLANET MONEY (June 30, 2011, 3:58 PM), <https://www.npr.org/sections/money/2011/07/05/137530847/how-much-does-it-cost-to-make-a-hit-song>.

<sup>5</sup> Dom Galeon, *The World’s First Album Composed and Produced by an AI Has Been Unveiled*, FUTURISM (Aug. 21, 2017), <https://futurism.com/the-worlds-first-album-composed-and-produced-by-an-ai-has-been-unveiled> [<https://perma.cc/7YN7-Y6YP>] (signaling that more artists are prepared and willing to collaborate with AI).

<sup>6</sup> *Basic Grammy Guidelines*, RECORDING ACAD. GRAMMY AWARDS, [https://www.grammy.com/sites/com/files/59th\\_guidelines\\_quick\\_reference\\_guide.pdf](https://www.grammy.com/sites/com/files/59th_guidelines_quick_reference_guide.pdf) [<https://perma.cc/B8M7-QYVH>] (last visited Sept. 4, 2018).

<sup>7</sup> U.S. COPYRIGHT OFF., No. 10-35017, 68 ANN. REP. REG. COPYRIGHTS at 4 (1966).

<sup>8</sup> See NAT’L COMM’N ON NEW TECH. USES OF COPYRIGHTED WORKS, FINAL REPORT at 44–45 (1978) [hereinafter CONTU]; see also James Grimmelman, *There’s No Such Thing as a Computer-Authored Work—And It’s a Good Thing, Too*, 39 COLUM. J.L. & ARTS 403, 414 (2016) (“It is possible that some future computer programs could qualify as authors.”); Arthur R. Miller, *Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?*, 106 HARV. L. REV. 977, 1049 (1993).

<sup>9</sup> AMPER is an online, royalty free AI program that independently and quickly creates musical compositions and will be used as a case study throughout this Note. See Galeon, *supra* note 5.

<sup>10</sup> See generally Matthew Russell & Dr. Cole D. Ingraham DMA, *Data Science to Operationalize Machine Learning & Computational Creativity*, 7 N.Y. ARTIFICIAL

author. The U.S. Copyright Office requires possessing human biology to be an author of a copyrighted song because, it reasons, creativity is a human-only endeavor.<sup>11</sup> This reasoning engages in speciesism.<sup>12</sup> Today, human and artificial intelligence may differ in degree but not in kind.<sup>13</sup>

This Note will explore that notion and argue that the rule barring AIs from being joint authors with humans is unnecessary for musical compositions. Part I of this Note will provide a background on the romantic and alternative conceptions of authorship, how copyright law favors the alternative, and how current neuro-philosophical theories undermine the law's treatment of creativity and authorship. In Part II we will undergo an analysis of how this new, undermined theory of copyright applies to an AI composer, which will show that some AIs meet the constitutional, statutory, and common law requirements for authorship. Lastly, Part III will propose that the U.S. Copyright Office should amend its practices to allow for AI and human joint authorship for musical composition and recommend possible ways of restructuring the music industry to allow for the proposed changes. Although this Note will discuss constitutional authorship generally and include an examination of several cases analyzing other copyrightable subject matter, those discussions serve only as a means of highlighting the relevant issues. This Note's only focus is musical composition. Non-recognition of AI joint authorship nullifies the value of songwriting, which is antithetical to copyright's constitutional purpose of promoting progress.<sup>14</sup>

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INTELLIGENCE SPEAKER SERIES (Nov. 22, 2016), *available at* <https://www.slideshare.net/RizwanAHabib/nyai-7-topdown-vs-bottomup-computational-creativity-by-dr-cole-d-ingraham>.

<sup>11</sup> U.S. COPYRIGHT OFFICE, COMPENDIUM U.S. COPYRIGHT OFFICE PRACTICES § 306 (3d ed. 2017) [hereinafter COMPENDIUM] (requiring human authorship because Copyright “only protects the ‘fruits of intellectual labor’ that ‘are founded in the creative powers of the mind’”) (citing Trade-Mark Cases, 100 U.S. 82, 94 (1879)); *cf.* *Naruto v. Slater*, 888 F.3d 418 (9th Cir. 2018) (declining to hold that a monkey or other non-human could not be an author, and thus leaving the door open to non-human authorship).

<sup>12</sup> MAX TEGMARK, LIFE 3.0: BEING HUMAN IN THE AGE OF ARTIFICIAL INTELLIGENCE 32 (2017) (defining a “specieist” as someone who treats “certain life forms as inferior just because they [are] silicon-based rather than carbon-based”).

<sup>13</sup> *Id.* at 39, 52 (defining intelligence as the “[a]bility to accomplish complex goals” and “[c]omparing the intelligence of humans and machines today, we humans win hands-down on breadth”). But, “intelligence is ultimately all about information and computation, not about flesh, blood or carbon atoms.” *Id.* at 55; *see also* Grimmelmann, *supra* note 8, at 408 (stating that all authorship is algorithmic because, for example: “[an artist’s hand] is guided by neuronal firings in her brain in a way she does not consciously attempt to direct”); STEPHON ALEXANDER, THE JAZZ OF PHYSICS: THE SECRET LINK BETWEEN MUSIC AND THE STRUCTURE OF THE UNIVERSE 41 (2016) (describing a band’s composer as making “mind-bending compositional algorithms”).

<sup>14</sup> U.S. CONST. art. I, § 8, cl. 8 [hereinafter the Clause]. The Clause’s purpose comes from the text: “[t]o 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.” *Id.* *See* L. Ray Patterson, *Understanding the Copyright Clause*, 47 J. COPYRIGHT SOC’Y U.S.A. 365, 369–70 (2000) (“[O]ne purpose of copyright is to motivate authors to make their works accessible to

## I. THE HUMAN AUTHOR

From conception, the United States ingrained progress and economic gain within the purpose of the Intellectual Property Clause (the Clause), making the United States an oasis for creators.<sup>15</sup> This commercial undertone to the Clause differs from the Hegelian nature of copyright laws abroad, where an author's moral rights are paramount.<sup>16</sup> In the United States, copyright is a property right revolving around the works themselves, not a right that protects the author's integrity.<sup>17</sup> The Constitution's Framers, however, neglected to provide a strict definition of what an author is or who could be entitled to this property right.<sup>18</sup> Thus, in line with the Constitution's flexible nature, the definitions for authors and writings have changed over time.<sup>19</sup>

In the 200 years following the Constitution's ratification, Congress wrote statutes that expanded copyrightable subject matter to keep up with technological advances.<sup>20</sup> The modern conception of statutory authorship was born in the Copyright Act of 1976, which requires a work to be (1) original; (2) fixed; and (3) not an idea, system, process, or

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the public . . . [but] its constitutional goal is to promote learning . . ."). If the value of a work is null then there is no incentive to create new works. See Christopher Buccafusco, *A Theory of Copyright Authorship*, 102 VA. L. REV. 1229, 1258–59 (2016) (explaining that one of the goals of copyright law is to balance costs between creators and consumers, and to ensure the recovery of the costs of creation for authors by limiting copying). Recognizing joint authorship allows for all contributions to a work to be fully protected by copyright. See discussion *infra* Section II.A.4.

<sup>15</sup> U.S. CONST. art. I, § 8, cl. 8; see generally ELIZABETH WURTZEL, *CREATOCRACY: HOW THE CONSTITUTION INVENTED HOLLYWOOD* (2015) (arguing that the U.S. IP system has facilitated creation in a way far superior to its economic rivals abroad).

<sup>16</sup> Russell J. DaSilva, *Droit Moral and the Amoral Copyright: A Comparison of Artists' Rights in France and the United States*, 28 BULL. COPYRIGHT SOC'Y U.S.A. 1, 3 (1980) (explaining that moral rights are not pecuniary but serve to protect integrity of works and the author's personality displayed within them).

<sup>17</sup> See Patterson, *supra* note 14, at 368–71 (discussing how copyright in the United States is a property right with economic undertones that results from the ability to control access to the work).

<sup>18</sup> Buccafusco, *supra* note 14, at 1230 (2016).

<sup>19</sup> Thomas Jefferson envisioned that the Constitution would be rewritten, in its entirety, every twenty or so years to keep up with the times. See, e.g., Margot Adler, *Reconstituting the Constitution: How to Rewrite It?*, NPR (Dec. 10, 2011, 6:20 AM), <http://www.npr.org/2011/12/10/143354018/reconstituting-the-constitution-how-to-rewrite-it>. This is obviously not what happened, but it is evidence of the Constitution's flexible nature.

<sup>20</sup> Compare Copyright Act 1790, 15 § 1, 1 Stat. 124, 124 (1790) (defining an author's writings as only maps, charts, and books), with Buccafusco, *supra* note 14, at 1231–33, 1238 (explaining that constitutional copyright protection is limited to only the categories determined by Congress, and describing how Congress added engravings, etchings, prints, musical compositions, dramatic compositions, photographs, paintings, and drawings in statues between 1802 and 1870); compare Copyright Act of 1909, Pub. L. No. 60-349, ch. 320 § 4, 35 Stat. 1075, 1077 (1909) (copyrightable subject matter includes "all the writings of an author"), with Buccafusco, *supra* note 14, at 1236–37 (explaining that the phrase "all the writings of an author" was not a constitutionally expansive definition of authorship).

discovery.<sup>21</sup> The essence of Congress's intent over this time was to expand copyrightable subject matter while maintaining a narrower definition of authorship than what was constitutionally permissible.<sup>22</sup> This expansion is why an originalist reading of the Clause, allowing an author to be only what the Framers knew of when they drafted it, is antithetical to the Clause itself; inherent to "progress" is recognizing novel ideas.<sup>23</sup>

So, what is an author? The romantic theory of authorship views the author as a genius who plucks creative expressions out of non-existence.<sup>24</sup> The author, or perhaps more aptly, *auteur*, is someone with a supreme ability to impart their creative genius upon a work.<sup>25</sup> This conception of authorship is acknowledged by most nations as evidenced by their embrace of moral rights.<sup>26</sup> However, copyright law in the United States rejects moral rights.<sup>27</sup> And in doing so, it implicitly rejects romantic authorship.<sup>28</sup> This rejection is why the United States' utilitarian copyright system protects things as mundane as the contents of the yellow pages of a telephone book.<sup>29</sup>

If we accept utilitarianism<sup>30</sup> as a subtext for understanding authorship in the United States, then it is easier to understand how both

<sup>21</sup> Copyright Act of 1796, Pub. L. 94-553, § 102, Oct. 19, 1976, 90 Stat. 2541 (1976) (codified as amended at 17 U.S.C. § 102 (2012)). Subsection (a) identifies subject matter, and subsection (b) creates the idea/expression dichotomy. 17 U.S.C. § 102 (2012). Anything in subsection (a) that is an "idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied," is not protectable authorship. *See id.*; *see also* discussion *infra* Section II.A.3.

<sup>22</sup> Buccafusco, *supra* note 14, at 1237.

<sup>23</sup> Megan M. Carpenter, *If It's Broke, Fix It: Fixing Fixation*, 39 COLUM. J.L. & ARTS 355, 357 (2016) ("Copyright law is also creative. It has historically, and importantly, evolved in response to cultural development.").

<sup>24</sup> Jacqueline Rhodes, *Copyright, Authorship, and the Professional Writer*, 8 CARDIFF CORVEY: READING ROMANTIC TEXT 1, 2 (2002) ("[The] commonsensical view of [romantic] authorship derives from the Western philosophical tradition defining the autonomous individual as the source or foundation of all knowledge.") (internal quotation marks omitted).

<sup>25</sup> F. Jay Dougherty, *Not a Spike Lee Joint? Issues in the Authorship of Motion Pictures Under U.S. Copyright Law*, 49 UCLA L. REV. 225, 268 (2001) (although, regarding films, the *auteur* of is the director because the film "reflect[s] [his] personality, [his] genius").

<sup>26</sup> Rikki Sapolich, *When Less Isn't More: Illustrating the Appeal of a Moral Rights Model of Copyright Through a Study of Minimalist Art*, 47 IDEA 453, 476 (2007) ("[Moral rights are] more analogous to civil rights or rights of publicity and seek to protect the artist's extension of herself.").

<sup>27</sup> *Id.* ("Moral rights conflict with traditional common law property rights; therefore American copyright law has resisted [them].").

<sup>28</sup> *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345 (1991) (requiring for authorship only "some creative spark" rather than genius).

<sup>29</sup> *Id.* at 361 (suggesting that copyright could confer on the yellow pages but not the white pages).

<sup>30</sup> "The doctrine that an action is right in so far as it promotes happiness, and that the greatest happiness of the greatest number should be the guiding principle of conduct." *Utilitarianism*, OXFORD DICTIONARIES, <https://en.oxforddictionaries.com/definition/utilitarianism> [<https://perma.cc/Z79J-6FBT>] (last visited Sept. 9, 2018).

Beethoven and Rebecca Black,<sup>31</sup> or Jackson Pollack and a five-year-old whose doodle has achieved refrigerator status,<sup>32</sup> can be authors. As long as a work produces some mental effect (i.e., an emotional response) on an audience, then whomever (or perhaps whatever) created the work can be an author.<sup>33</sup> And, the mental effects elicited don't have to be the ones initially intended<sup>34</sup> as long as some meaning is transmitted to the audience by the work.<sup>35</sup> In spirit, it is how the work is received, not the creator's self-proclamation of status, that confers authorship.<sup>36</sup> The cases that shaped the definition of legal authorship show that courts favor this utilitarian theory of authorship. In the end, the cases reveal that the conception of authorship has devolved from genius, to artistry, to personality,<sup>37</sup> to pure algorithmic intelligence. This devolution will, in turn, allow for AIs to elevate their status.

### A. *What Do Authors Do?*

#### 1. Authors Fix Works

An author must “fix” his idea in a copy that is permanent enough to be perceived by an audience for a transitory period in order to receive copyright protection.<sup>38</sup> Fixation is a constitutional requirement derived from the inclusion of the word “writings” in the Clause.<sup>39</sup> Fixation has, for the most part, been easy to satisfy.<sup>40</sup> Musical works embodied in CDs, sheet music, tapes, cassettes, and vinyl are all easily considered

<sup>31</sup> Rebecca Black, of short-lived internet fame, for the viral hit “Friday.” Rebecca Black, *Friday*, YOUTUBE (Sept. 16, 2011), <https://www.youtube.com/watch?v=kfVsfOSbJY0>.

<sup>32</sup> Mike Masnick, *How Does Copyright Apply to Your Kids' Monster Drawings?*, TECHDIRT (Mar. 11, 2010, 3:02 AM), <https://www.techdirt.com/articles/20100306/1734078452.shtml> [<https://perma.cc/8GCZ-9T4J>] (“There is no doubt that the children’s original doodles are protected by copyright for their entire life, plus 70 additional years.”).

<sup>33</sup> Buccafusco, *supra* note 14, at 1260 (“[A]n author is a human being who intends to produce one or more mental effects in an audience by an external manifestation of behavior.”).

<sup>34</sup> Bruce E. Boyden, *Emergent Works*, 39 COLUM. J.L. & ARTS 377, 385–91 (2016) (discussing the uncertainty of how the meaning that an author intends to transmit through their works will be received).

<sup>35</sup> Buccafusco, *supra* note 14, at 1260–61 (noting that an author who intends for their work to have a parodical effect on their audience may not have their work be received as a parody).

<sup>36</sup> MICHEL FOUCAULT, *What is an Author, in AESTHETICS, METHOD, AND EPISTEMOLOGY* 205 (James D. Faubion ed., 1998) (discussing how an author is received through his works and achieves his status as such); *see also* *Bleistein v. Donaldson Lithographing Co.*, 188 U.S. 239, 252 (1903) (conferring authorship to the creator of otherwise bland circus posters because they “command[ed] the interest of [the] public”).

<sup>37</sup> Annemarie Bridy, *Coding Creativity: Copyright and the Artificially Intelligent Author*, 2012 STAN. TECH. L. REV. 5, 12 (2012) [hereinafter Bridy I].

<sup>38</sup> 17 U.S.C. §§ 101–02 (2012).

<sup>39</sup> *Kelley v. Chicago Park Dist.*, 635 F.3d 290, 303 (7th Cir. 2011) (“[A]uthorship and fixation are *explicit* constitutional requirements; the Copyright Clause empowers Congress to secure for ‘authors’ exclusive rights in their ‘writings.’”) (emphasis in original).

<sup>40</sup> *Id.* at 304 (“[M]ost works presented for copyright are . . . unambiguously fixed.”).

fixed.<sup>41</sup> Fixation is complicated, however, when changes occur to the work or its medium over time.

The Seventh Circuit recently grappled with that type of change. In *Kelley v. Chicago Park District*, the court determined that a garden was not copyrightable subject matter because it was not fixed.<sup>42</sup> When the city of Chicago reduced the size of Mr. Kelley's garden, he sued for a violation of his moral rights.<sup>43</sup> The reduction was not at issue because the court held that the garden initially lacked sufficient fixation to qualify as a "writing"—because the essence of a garden is its perpetually changing nature.<sup>44</sup> The changes were not eligible because they were not a product of human force or deliberation, a current requirement for authorship, but instead forces of nature.<sup>45</sup> Although heavily criticized, the holding in *Kelley* implies that when subsequent changes occur to a work, the changes must be deliberate, foreseeable, and predictable to the person claiming the author's right, to be fixed.<sup>46</sup>

## 2. Authors Originate Things

Unlike fixation, originality in a work was not explicitly required by the Constitution<sup>47</sup> but has been made so by statute.<sup>48</sup> Several cases developed what "originality" means. Its theoretical underpinnings, derived from the Lockean theory of intellectual labor<sup>49</sup> have

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<sup>41</sup> *Id.* ("A musical composition may be embodied in sheet music, on an audio-tape, on a compact disc, on a computer hard drive or server, or as part of a motion picture soundtrack.") (internal citation omitted).

<sup>42</sup> See generally *Kelley*, 635 F.3d 290.

<sup>43</sup> *Id.* at 291–92 (Kelley sued under the Visual Artists Rights Act, which narrowly endorses moral rights for visual arts).

<sup>44</sup> *Id.* at 304–05.

<sup>45</sup> *Id.* at 304 (noting that "authorship is an entirely human endeavor" and that birds dropping new seeds, the dying and regrowth of the flowers, and change of seasons were not the products of a human) (internal quotation marks omitted). But see Zahr K. Said, *Copyright's Illogical Exclusion of Conceptual Art*, 39 COLUM. J.L. & ARTS 335, 343 (2016) ("[T]he fixation requirement does not require permanence."); Carpenter, *supra* note 23, at 364 ("Removing the transitory duration exclusion will enable fixation to serve the valuable function of delineating the boundaries of a work.").

<sup>46</sup> Said, *supra* note 45, at 346; see Boyden, *supra* note 34, at 388 (stating that the court in *Kelley* found that the "amount of variation overwhelmed whatever meaning or message Kelley may have intended to send"); see also *Williams Elec., Inc. v. Artic Int'l, Inc.*, 685 F.2d 870 (3d Cir. 1982) (holding that a video game's visual changes under user control were fixed because they were predictable and continuously repeated).

<sup>47</sup> *Kelley*, 635 F.3d at 303 ("Unlike originality, authorship and fixation are *explicit* constitutional requirements . . . [but] [t]he originality requirement is implicit in these express limitations on the congressional copyright power.") (emphasis in original) (internal citations omitted).

<sup>48</sup> 17 U.S.C. § 102(a) (2012) ("Copyright protection subsists . . . in *original* works of authorship.") (emphasis added).

<sup>49</sup> *Trade-Mark Cases*, 100 U.S. 82, 94 (1879) (copyrightability is derived from "the fruits of intellectual labor"). For the proposition that the Lockean theory of intellectual labor no longer controls, compare *Alva Studios, Inc. v. Winninger*, 177 F. Supp. 265, 266, 268 (S.D.N.Y. 1959)

transformed into its modern conception as stated in *Feist Publications, Inc. v. Rural Telephone Service Co.*

The transformation began in the 1884 Supreme Court opinion *Burrow-Giles Lithographic Co. v. Saroni*,<sup>50</sup> where the Court considered the copyrightability of a photograph of Oscar Wilde.<sup>51</sup> Petitioner, Burrow-Giles, argued that a photograph was not protectable because photographs were only a literally “mechanical” reproduction of real life, and real life is free for everyone to copy.<sup>52</sup> The Court rejected this argument and opined that an author was someone who creates things that are original to them.<sup>53</sup> Therefore, any work that owed its existence to the author’s mental ingenuity could be copyrightable subject matter, even if the subject already existed in the world.<sup>54</sup> Saroni (the photographer) made choices original to only him to express Wilde’s infamous *ennui*, thus making Saroni the author and the photo copyrightable.<sup>55</sup>

Nineteen years later, the Supreme Court reexamined authorship in *Bleistein v. Donaldson Lithographing Co.*<sup>56</sup> The case, which evaluated an illustration of circus acts on an advertisement,<sup>57</sup> created two key authorship doctrines. First, the non-discrimination doctrine said that judges, trained only in law, are not in a position to evaluate the worth—or aesthetic—of art.<sup>58</sup> Second, it established the doctrine of independent creation.<sup>59</sup> An author expresses his unique personality in the works he creates, therefore, anything created by a particular author will always be minimally original.<sup>60</sup> Despite the advertisement being objectively less

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(holding that a miniaturized reproduction of Rodin’s “Hand of God” was copyrightable because “[i]t takes an extremely skilled sculptor” working many hours to reproduce it with exact detail) (internal quotation marks omitted), *with Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258, 1261–62 (10th Cir. 2008) (holding that digital 3D replications of Toyota vehicles were not copyrightable despite the “challenge” of digitally sculpting the models and the “80 to 100 hours of effort per vehicle”).

<sup>50</sup> *Burrow-Giles Lithographic Co. v. Saroni*, 111 U.S. 53 (1884).

<sup>51</sup> *Id.* at 54.

<sup>52</sup> *Id.* at 56.

<sup>53</sup> *Id.* at 57–58 (an author is “he to whom anything owes its origin [sic]”) (internal quotation marks omitted).

<sup>54</sup> *Id.* at 60 (the photograph’s existence was “entirely from [an author’s] own original mental conception” and “the product of [an author’s] intellectual invention”).

<sup>55</sup> *Id.* (holding the important choices were, *inter alia*, setting and lighting the scene, picking costumes, angling the camera, and posing Wilde).

<sup>56</sup> 188 U.S. 239 (1903).

<sup>57</sup> *Id.* at 248.

<sup>58</sup> *Id.* at 251 (“It would be a dangerous undertaking for persons trained only to the law to constitute themselves final judges of the worth of pictorial illustrations, outside of the narrowest and most obvious limits.”).

<sup>59</sup> *Id.* at 249–50 (holding that works must be independently created by the author, or, in other words, not copied).

<sup>60</sup> *Id.* at 250 (“Personality always contains something unique. It expresses its singularity even in handwriting, and a very modest grade of art has in it something irreducible, which is one man’s alone.”). So, even making reproductions of the real world will be *original* to the author. *Id.*



aesthetic than a Monet, it was a work of authorship, thus lowering copyright's requisite creativity again.<sup>61</sup>

In *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*,<sup>62</sup> the Second Circuit ruled on the copyrightability of new engravings of a public domain work.<sup>63</sup> The court made efforts to distinguish novelty from originality.<sup>64</sup> It noted that the bar for novelty is significantly higher for patents, whereas for copyrights novelty is unnecessary.<sup>65</sup> However, a work must contain some variation—intentional or inadvertent—that can be attributed to the author and is more than merely trivial.<sup>66</sup> The court went further to recognize that the work of engravers is “almost invariably” the work of a copyist, but that courts should look at the *way* engravers make *choices* to deviate from the underlying work when considering what is protectable.<sup>67</sup> The court thus indicates that many creations are derivative. But as long as distinguishable variation can be found from some creative decision by an author, those variations, no matter how minimal, can be protected.<sup>68</sup>

Finally, the modern definition of originality comes from *Feist*, where the Supreme Court probed the copyrightability of a phonebook's white page listings.<sup>69</sup> While noting that “the *sine non qua* of copyright is originality,” it went further to say that the amount of creativity required is extremely low—basically any will do.<sup>70</sup> This reduced originality to its lowest ebb.<sup>71</sup> Courts require only that some creativity is present.<sup>72</sup> Despite the petitioner telephone company independently creating the white pages, the Court found that listing last names alphabetically was insufficiently creative.<sup>73</sup> No amount of physical or mental labor for compiling the listings would be sufficient for copyright unless the author made creative choices in arranging them; originality, not the

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<sup>61</sup> *Id.* at 250–51 (finding the work copyrightable).

<sup>62</sup> 191 F.2d 99 (2d Cir. 1951). The works in question were plaintiff's mezzotint engravings of the public domain oil painting *The Blue Boy* by Thomas Gainsborough, originally made in 1779. *Id.* Defendant made copies of the engravings and argued that they were not valid copyrightable subject matter, as they were copied from the public domain. *Id.* at 104.

<sup>63</sup> *Id.* at 104–05.

<sup>64</sup> *Id.* at 101–02 (Congress made efforts to make two distinct IP regimes: one for patents, which require novelty; and then for copyrights, which do not).

<sup>65</sup> *Id.* at 102.

<sup>66</sup> *Id.* at 103, 105 (inadvertent changes, such as a misplaced paint stroke caused by a shock of thunder, may yield sufficiently distinguishable variations).

<sup>67</sup> *Id.* at 104 n.22.

<sup>68</sup> *Id.* at 104–05 (the variations were purposeful because they did not intend to recreate the original oil painting).

<sup>69</sup> *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340 (1991).

<sup>70</sup> *Id.* at 345 (“[T]he requisite level of creativity is extremely low; even a slight amount will suffice.”).

<sup>71</sup> *Id.*

<sup>72</sup> *Id.* (stating that a “creative spark, ‘no matter how crude, humble, or obvious’” must be present) (internal citation omitted).

<sup>73</sup> *Id.* at 362 (finding that the phone book compilers' choice was a “garden-variety white pages directory, devoid of even the slightest trace of creativity”).

“sweat of the brow,” is the touchstone of copyright.<sup>74</sup>

Thus, for a work of authorship to be original, the work must (1) owe its origin to the author; and (2) possess some creative spark.<sup>75</sup> And, to determine whether some creative spark exists, the choices made and the way those choices are expressed must be considered.<sup>76</sup> This last part matters because copyright will not protect everything an author does.

### 3. Authors Express Ideas

Copyright is granted for only authors’ expressions of ideas and not their ideas themselves.<sup>77</sup> The difference between protectable expression<sup>78</sup> and unprotectable ideas<sup>79</sup> is known as the idea/expression dichotomy or, more appositely, spectrum.<sup>80</sup> The implications of the idea/expression spectrum are three-fold. First, it limits protection to only the original expressions of authors, not the underlying idea, which is subject to patent law.<sup>81</sup> Second, it recognizes that some ideas can only be expressed in one way, or are part of a specific genre (called *scenes a faire*<sup>82</sup>) and therefore unprotectable.<sup>83</sup> Third, it realizes that while some expressions are unprotectable by themselves, an original and not random arrangement of those expressions may be protectable.<sup>84</sup> These

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<sup>74</sup> *Id.* at 359–60. Telephone numbers are facts. This means that copyright cares only about the expressive content of an author’s work and not the amount of time they spent creating that work. *See id.* at 358–59.

<sup>75</sup> *Id.* at 346.

<sup>76</sup> *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, 191 F.2d 99, 104 n.22 (2d Cir. 1951).

<sup>77</sup> *Oracle Am., Inc. v. Google Inc.*, 750 F.3d 1339, 1354 (Fed. Cir. 2014) (“Copyright protection extends only to the expression of an idea—not to the underlying idea itself.”).

<sup>78</sup> 17 U.S.C. § 102(a) (2012).

<sup>79</sup> *Id.* at § 102(b).

<sup>80</sup> *See Oracle Am., Inc.*, 750 F.3d at 1354–55; *see also* Douglas Lichtman, *Copyright as a Rule of Evidence*, 52 DUKE L.J. 683, 731 n.204 (2003) (“[T]he idea/expression dichotomy is more of a vague spectrum than a precise line.”).

<sup>81</sup> *See generally* *Baker v. Selden*, 101 U.S. 99 (1879). In *Selden*, the copyrighted work was a book for an accounting method and contained minimal copyrightable expression. *Id.* at 99–100. The Court reasoned that there were extremely finite ways of expressing these ideas, so those expressions don’t count for copyright. *Id.* at 101–02. The copyright in the book did not extend to the method itself, which is better suited for patent law. *Id.*

<sup>82</sup> *See* *Hoehling v. Universal City Studios, Inc.*, 618 F.2d 972, 979 (2d Cir. 1980). *Scenes a faire* doctrine says that if an element is necessary to a certain genre then it is a non-protectable expression, i.e., German Beer Halls in stories about Germany. *Id.* This notion is complicated in musical composition where certain compositional techniques are unquestionably *scenes a faire*. Slide-guitars and country music are inseparable in the genre. *But see* *Williams v. Bridgeport Music, Inc.*, No. LA CV13–06004 JAK (AGRx), 2015 WL 4479500 (C.D. Cal. July 14, 2015), *aff’d sub nom.* *Williams v. Gaye*, 895 F.3d 1106 (9th Cir. 2018) (holding that the overall feel of a Marvin Gaye song is protectable, portending more protection for music).

<sup>83</sup> *See, e.g., Baker*, 101 U.S. 99; *supra* text accompanying note 81; *see also* *Satava v. Lowry*, 323 F.3d 805, 812 (9th Cir. 2003) (Satava, author of glass-in-glass jellyfish sculptures, was given protection against “only virtually identical copying”).

<sup>84</sup> *See* *Roth Greeting Cards v. United Card Co.*, 429 F.2d 1106, 1109–10 (9th Cir. 1970) (concluding that unprotectable elements of a greeting card together created an overall look and

three implications limit protection for musical compositions because: (1) the rules and notes (or ideas) at a composer's disposal limit the expressions available; and (2) most musical expressions are expected, indeed inseparable, from the genres that use them.<sup>85</sup> The idea/expression spectrum is why, for example, the Lion King can be based on the ideas portrayed in Hamlet and not be infringing.<sup>86</sup> Overall, putative authors who come up with only ideas but do not express them in original and creative ways are not authors.

#### 4. Authors Work with Other Authors

Teams of songwriters compose most modern music.<sup>87</sup> Although the term "joint authorship" is not expressly used in the statute, the definition for "joint work" implies it.<sup>88</sup> When authors collaborate, they create a joint work.<sup>89</sup> Those authors must, however, intend their separate contributions to be combined.<sup>90</sup> And each author's contribution, by itself, must be copyrightable.<sup>91</sup> If a composer and lyricist agreed to collaborate, a joint work could result.<sup>92</sup>

The underlying tension in joint authorship claims is determining the threshold for when a hopeful joint author's contribution is sufficient for actual joint authorship. To make that determination we must ask two questions: (1) did the hopeful joint author make an independently

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feel that was original and copyrightable). *But see* ATC Distribution Grp., Inc. v. Whatever It Takes Transmissions & Parts, Inc., 402 F.3d 700 (6th Cir. 2005) (concluding that a numbering system for car parts was not copyrightable because it was randomly applied) [hereinafter *WITTP*]; *Satava*, 323 F.3d 805, 811 (9th Cir. 2003) ("[I]t is not true that *any* combination of unprotectable elements automatically qualifies for copyright protection.").

<sup>85</sup> *See* Metcalf v. Bocho, 294 F.3d 1069, 1074 (9th Cir. 2002) ("The particular sequence in which an author strings a significant number of unprotectable elements can itself be a protectable element. Each note in a scale, for example, is not protectable, but a pattern of notes in a tune may earn copyright protection."). *But see* *Bridgeport Music*, 2015 WL 4479500; *supra* text accompanying note 82 (expanding protection to overall feel).

<sup>86</sup> *Nichols v. Universal Pictures Corp.*, 45 F.2d 119, 121 (2d Cir. 1930) ("These would be no more than Shakespeare's 'ideas' in the play, as little capable of monopoly as Einstein's Doctrine of Relativity, or Darwin's theory of the Origin of Species.").

<sup>87</sup> *See* Sisario, *supra* notes 1, 3 and accompanying text.

<sup>88</sup> 17 U.S.C. § 101 (2012).

<sup>89</sup> *Id.* (defining joint work as "a work prepared by two or more authors with the intention that their contributions be merged into inseparable or interdependent parts of a unitary whole"); *see also* H.R. REP. NO. 94-1476, pt. 1, at 120, *as reprinted in* 1976 U.S.C.C.A.N. 5659, 5736 (1976) ("The touchstone here is the intention, at the time the writing is done, that the parts be absorbed or combined into an integrated unit, although the parts themselves may be either 'inseparable' (as the case of a novel or painting) or 'interdependent' (as in the case of a motion picture, opera, or the words and music of a song).").

<sup>90</sup> 17 U.S.C. § 101.

<sup>91</sup> PAUL GOLDSTEIN, COPYRIGHT: PRINCIPLES, LAW AND PRACTICE § 4.2.1.2, at 379 (1989).

<sup>92</sup> *See, e.g.*, *Edward B. Marks Music Corp. v. Jerry Vogel Music Co.*, 140 F.2d 266 (2d Cir. 1944) (finding a joint work existed between a songwriter and second-in-time lyricist who didn't know each other).

copyrightable contribution; and (2) did the other co-authors intend to share authorship.<sup>93</sup> Both prongs must be met.<sup>94</sup> So, even if a hopeful joint author contributes copyrightable expression, that contribution alone is insufficient if the other authors never intended to share theirs.<sup>95</sup> These two requirements allow actual authors to fend off “spurious claims” of authorship from non-integral persons involved in the creative process, freeing them to solicit ideas without diluting their ownership interest.<sup>96</sup> Any other rule would lead to so many people qualifying as authors—including someone in the back of a studio who thought “hand-claps” would sound good in a song—that the final work would be a proverbial “Swiss cheese of copyrights.”<sup>97</sup> Therefore, courts must determine if the putative authors intend to share.

Determining the intent to share element requires examining the relationships between the several putative authors. Where there is a clear, dominant author, joint authorship will result only if they fully intend to share with the other subordinate authors.<sup>98</sup> Dominant authorship in a relationship between several authors is determined by establishing which author maintains control over the work throughout the creative process. Control over a work involves examining the following subjective and objective elements: (1) decision-making authority; (2) billing and credit; (3) written contracts; and (4) other subjective evidence.<sup>99</sup>

The decision-making authority element, the most important to

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<sup>93</sup> *Childress v. Taylor*, 945 F.2d 500, 506–09 (2d Cir. 1991) (requiring each of the putative co-authors to: (1) make an independently copyrightable contribution to the work; and (2) fully intend to be co-authors).

<sup>94</sup> *Id.*

<sup>95</sup> In *Childress*, Taylor gave Childress, a playwright, several historical facts and ideas about the play’s main character, “Moms” Mabley, but Childress actually wrote the play. *Id.* at 502. The court concluded that Taylor’s contribution of only ideas was not sufficient for joint authorship. *Id.* at 509. The relationship between Childress and Taylor eventually deteriorated over contract agreements requiring a joint authorship stake, which Childress rejected. *Id.* at 503–04; see also *Erickson v. Trinity Theatre, Inc.*, 13 F.3d 1061 (7th Cir. 1994) (finding several actors’ ideas, brainstormed during the development of the play and given to the playwright, were insufficient to constitute joint authorship).

<sup>96</sup> *Erickson*, 13 F.3d at 1070 (“[A]ny restriction on the free exchange of ideas stifles creativity to some extent . . . [and] might jeopardize the author’s sole entitlement to a copyright.”); *Childress*, 945 F.2d at 507 (this rule fends off “spurious claims by those who might otherwise try to share the fruits of the efforts of a sole author”).

<sup>97</sup> *Garcia v. Google, Inc.*, 786 F.3d 733, 742 (9th Cir. 2015) (en banc) (denying an authorship claim for an individual actress’s performance because otherwise each actor involved in the film could be an author).

<sup>98</sup> *Childress*, 945 F.2d at 508 (“[I]t is only where the dominant author *intends to be sharing authorship* that joint authorship will result.”) (internal quotation marks omitted); *Thomson v. Larson*, 147 F.3d 195, 201–06 (2d Cir. 1998) (“[E]qual sharing of rights should be reserved for relationships in which all participants fully intend to be joint authors.”) (citing *Childress*, 945 F.2d at 509).

<sup>99</sup> See, e.g., *Thomson*, 147 F.3d at 201–06; see also 1 MELVILLE B. NIMMER & DAVID NIMMER, NIMMER ON COPYRIGHT § 6.07 (Matthew Bender Rev. ed. 2018) (endorsing these elements); WILLIAM F. PATRY, 2 PATRY ON COPYRIGHT §§ 5:20–28 (Sept. 2018 update) (same).

consider here, looks to see who has control over what eventually ends up in a finished work.<sup>100</sup> The Ninth Circuit fully expanded this concept to the extent that if an author superintends the entire creative process, they could be the dominant (and sometimes sole) author of the work even if another putative author makes a copyrightable contribution.<sup>101</sup> This expansion has not gone without critique. It allows for “master minds,” such as movie studios, who make minimal copyrightable contributions, to overpower other authors’ claims, which conflicts with copyright’s purpose.<sup>102</sup> At bottom, joint authorship will result when the creative process is truly collaborative among the authors.<sup>103</sup>

### B. Conceptualizing Creative Thinking in Copyright

However, to understand the full scope of authorship, we must examine what creative decision-making—a constant theme underlying the cases discussed above—means.<sup>104</sup> The law theorizes that an author is someone who intends to create something<sup>105</sup> or intends to express ideas that affect an audience.<sup>106</sup> However, which creative choices are sufficient to yield legal authorship has not received much attention by the courts.<sup>107</sup> Creativity is grounded in the Clause’s goal to promote

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<sup>100</sup> *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258, 1268 (10th Cir. 2008) (“[L]ook only at the final *product*, not the process” when assessing the originality of a work for copyright protection) (emphasis in original); see also *Thomson*, 147 F.3d at 203 (“The district court determined that Larson, [the playwright], ‘retained and intended to retain at all times sole decision-making authority as to what went into [the Broadway play] *Rent*.’ . . . Thomson understood ‘that the question whether any contribution she might make would go into the script was within Mr. Larson’s sole and complete discretion.’ . . . Larson had final approval over all changes to *Rent* and that all such changes would become Larson’s property.”).

<sup>101</sup> See *Aalmuhammed v. Lee*, 202 F.3d 1227 (9th Cir. 2000). Mr. Aalmuhammed contributed to the movie *Malcolm X* by supplying details about the life of Malcolm X to ensure historical accuracy, even going so far as to write two new scenes. *Id.* at 1229–31. Mr. Aalmuhammed was not an author because Warner Brothers, the studio, was the “master mind” behind the film by retaining complete and authoritative control over final decisions. *Id.* at 1235–36.

<sup>102</sup> Followed to its logical conclusion, a “master mind,” who made very little copyrightable contribution, but has complete authority over content will inequitably overpower authors, stealing away their rights. If copyright law is supposed to encourage creativity, this stance is at odds with that. See *NIMMER*, *supra* note 99, § 6.07.

<sup>103</sup> *Greene v. Ablon*, 794 F.3d 133, 151 (1st Cir. 2015) (finding that authors’ intention to combine their contributions is unaffected by the quality or quantity of the work, as long as they “achieve their primary significance because of their combined effect”) (internal citation and quotation marks omitted).

<sup>104</sup> See *Buccafusco*, *supra* note 14, at 1231–32 (“Creativity is a scalar concept involving more or less novelty or cleverness.”).

<sup>105</sup> *Id.* at 1247.

<sup>106</sup> *Boyden*, *supra* note 34, at 381–82.

<sup>107</sup> *Buccafusco*, *supra* note 14, at 1246 (explaining that the decision in *Feist*, requiring some minimal level of creativity, has been “unsatisfactory” because “[i]t has [] provided very little guidance on what creativity means and how it is to be judged. Just as importantly, the Court’s opinion says virtually nothing about the *kind* of creativity that matters for authorship”)

progress, which can be interpreted as encouraging authors to efficiently create works by providing incentives.<sup>108</sup> We can judge how authors make these creative decisions by examining the content they've consumed and how they've utilized it in their works.<sup>109</sup> To understand how their creative decisions are optimized, we must further understand how authors balance incentives and motivations with other factors such as costs of creating.<sup>110</sup> The interplay between these elements, however, is ultimately a question of psychology.<sup>111</sup>

Psychologists describe creativity as a mental process that makes something new and appropriate for a particular cultural audience,<sup>112</sup> or as the “bending, blending, and breaking” of previously consumed ideas and themes.<sup>113</sup> Both of these descriptions require authors to absorb content, store it in memory, and subsequently recall it to create something new.<sup>114</sup> These descriptions also align with conceptions of creativity made by the courts.<sup>115</sup> Further, we can bifurcate creativity into

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(emphasis in original).

<sup>108</sup> See Christopher Buccafusco, Zachary C. Burns, Jeanne C. Fromer & Christopher Jon Sprigman, *Experimental Tests of Intellectual Property Laws' Creativity Thresholds*, 92 TEX. L. REV. 1921, 1932–33 (2014) [hereinafter Sprigman] (“Assessing creativity is not complete without reference to a work's effect on the relevant culture and its social judgments. . . . [C]reativity looks similar to IP law's aim of giving protection for products that are requisitely new, while leaving to society the question of how valuable the product ought to be considered.”); see also Boyden, *supra* note 34.

<sup>109</sup> Buccafusco, *supra* note 14, at 1258 (“[C]opyright law's fundamental goal [is] optimizing creative production.”).

<sup>110</sup> *Id.* at 1256, 1281 (arguing that optimization occurs when the interests of creators and the public who receives those works are balanced. “Copyright law exists to solve a particular economic problem—optimizing creative production through the balanced provision of incentives.”).

<sup>111</sup> Sprigman, *supra* note 108, at 1931–32 (recognizing that IP laws' utilitarian basis is intertwined with psychology).

<sup>112</sup> *Id.* at 1932 (“Newness refers to novelty or originality, and appropriateness indicates that some community recognizes the contribution as socially valuable.”).

<sup>113</sup> Angela Chen, *Neuroscientist David Eagleman and Composer Anthony Brandt Explain How Creativity Works*, VERGE (Nov. 5, 2017, 10:00 AM), <https://www.theverge.com/2017/11/5/16597660/david-eagleman-anthony-brandt-runaway-species-creativity-neuroscience-psychology-design-interview> [<https://perma.cc/3HRU-FVPB>] (“In music, bending is a theme in variations, just taking an original and remodeling it in some way. Breaking is fragmentation of a theme, it's motifs. And blending can be counterpoint where you're playing multiple melodies at the same point. . . . [T]hose three cognitive strategies are always intertwined.”); see also Bridy I, *supra* note 37, at 29 (“[Margaret] Boden, whose work in the field of computational creativity has been enormously influential . . . defines creativity as ‘the ability to generate novel, and valuable ideas.’”) (internal citation omitted).

<sup>114</sup> ALEXANDER, *supra* note 13, at 175 (“You find some licks in [a Charlie Parker] solo that you like and commit it to memory . . . You realize that at any given time in your solo, you are aware of all seven notes at the same time. . . . [T]his familiarity means that you are intensely aware of the fact that the next note you play depends on the previous notes you played. The likelihood for playing one of these seven notes is conditioned by memory and repertoire.”).

<sup>115</sup> Fred Fisher, Inc. v. Dillingham, 298 F. 145, 147 (S.D.N.Y. 1924) (Judge Hand opining that “[e]verything registers somewhere in our memories, and no one can tell what may evoke it,” when describing how defendant may have unconsciously copied plaintiff's work); see also Bridy I, *supra* note 37, at 30 (“A work can still be considered original under copyright law even if another person has already created it, as long as the second work is not copied from the

distinct categories of thought: divergent and convergent.<sup>116</sup> Divergent thought is the ability to come up with myriad ways to solve a problem; convergent thought is finding only the best answer.<sup>117</sup> Creativity then boils down to an ability to take previously consumed ideas and repackaged them for solving new problems.<sup>118</sup> Therefore, something—or someone—that is creative likely has high intelligence and cognitive inhibition<sup>119</sup> to allow for the efficient manipulation of previously consumed data.<sup>120</sup> These are crucial qualities for creative beings because generating and expressing ideas, as opposed to evaluating them, is mostly an unconscious process<sup>121</sup> rooted within their unique biology.<sup>122</sup>

So, what motivates an author to create? Motivation can be either extrinsic or intrinsic.<sup>123</sup> Extrinsic motivation comes from a source that is external to the individual, such as formal intellectual property rights and a subsequent monetary reward.<sup>124</sup> By contrast, humans are intrinsically motivated by internal satisfaction—their biological joy of creating.<sup>125</sup> Studies have shown that intrinsic motivations are more conducive to creativity and are more important than external incentives.<sup>126</sup> Therefore, external motivators and *ex post* incentives may be unnecessary for driving certain types of creativity.<sup>127</sup> For example, people created music long before copyright laws or financial rewards.<sup>128</sup>

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first.”).

<sup>116</sup> Sprigman, *supra* note 108, at 1934; *see also* Divya Sadana et al., *The Neuropsychology of Creativity: A Profile of Indian Artists*, 15 ACTA NEUROPSYCHOLOGICA 143, 144–45 (2017).

<sup>117</sup> Sprigman, *supra* note 108, at 1934.

<sup>118</sup> *See* sources cited *supra* notes 112–17 and accompanying text.

<sup>119</sup> Sadana, *supra* note 116, at 145–47 (inhibition promotes creation by expanding the array of information available to create new knowledge with).

<sup>120</sup> *Id.*

<sup>121</sup> ALEXANDER, *supra* note 13, at 174 (“I practice hard, and when I play, I don’t play what I practice. You can’t think and [improvise] at the same time. When I play, I don’t want to play the music; I want the music to play me.”) (quoting jazz musician Sonny Rollins); Sadana, *supra* note 116, at 153.

<sup>122</sup> ALEXANDER, *supra* note 13, at 228 (describing John Coltrane’s genius as “an ability to push those innate [biological] abilities far beyond the norm. . . . To paraphrase the infamous pig from *Animal Farm*, apparently some human brains are more unique than others.”); Sadana, *supra* note 116, at 154 (“[I]t can be hypothesized that functions such as fluency, the ability to shift mental states rapidly and associative semantic retrieval of information would be the cognitive aspects . . . aiding in [ ] idea generation.”).

<sup>123</sup> *See* Sprigman, *supra* note 108, at 1935.

<sup>124</sup> *Id.*

<sup>125</sup> *Id.*

<sup>126</sup> *Id.* at 1936–38, 1940, 1971 (“[T]hose who are extrinsically motivated will be less creative because they . . . will be more focused on the extrinsic motivation rather than the creative process itself. . . . [B]eyond an optimal level of arousal for executing tasks, further increases in arousal can lead to a decrement in performance. . . . [R]esearch indicates that monetary incentives could negatively affect creativity.”).

<sup>127</sup> *Id.* at 1926, 1936–41 (assessing various studies and finding several instances where external motivation and incentives did not result in better creative output, but it may be medium-specific, and noting that IP law incentives are tied to how each regime views which creations are worthy of rights, which is relatively low for copyright law).

<sup>128</sup> Colin Barras, *Did Early Humans, or Even Animals, Invent Music?*, BBC (Sept. 7, 2014),

Thus, creativity requires an author to (1) have motivation; (2) possess intelligence; and (3) use that intelligence and motivation to create something.<sup>129</sup> Anything that maintains these three elements and independently creates a work that meets copyright law's other requirements (fixation and originality) could arguably be an author.

### C. *Divorcing Creativity from Humanity*

If the above encapsulation is correct, then non-human entities could be creative and thus authors. But to get there, we must first accept that the human creative decision-making process is not unique or significant because only our underlying genetic programming drives it. This unpopular idea clashes with the romantic conception of authorship and creativity which is rooted in humanism: worship of all things human.<sup>130</sup> Humanism is a belief system that puts humans, and perhaps more importantly, the human experience, above all else.<sup>131</sup> Consistent with the humanist belief is the notion that all humans make decisions by their own free will.<sup>132</sup> This belief is reasonable to entertain, but contemporary science posits that "free will" may be a fallacy.<sup>133</sup> Instead, humans take action not because they freely choose to do so, but because the triggering of their unconscious, genetic, neurological algorithm tells them to.<sup>134</sup>

Luckily, we can leave this hotly contested debate over free will mostly behind. Current neuroscience supports a theory that says free will and determinism (the concept that all human actions are pre-determined by biology and the laws of physics) can work together.<sup>135</sup>

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<http://www.bbc.com/earth/story/20140907-does-music-pre-date-modern-man> [<https://perma.cc/5WEH-YQBJ>] ("[T]he earliest known musical instruments are just 40,000 years old. . . . [but] music itself is almost certainly significantly older.").

<sup>129</sup> See sources cited *supra* notes 112–27 and accompanying text.

<sup>130</sup> YUVAL NOAH HARARI, *HOMO DEUS: A BRIEF HISTORY OF TOMORROW* 66 (2017).

<sup>131</sup> *Id.* at 223.

<sup>132</sup> *Id.* at 225.

<sup>133</sup> *Id.* at 284.

<sup>134</sup> *Id.* ("Today when scholars ask why a man drew a knife and stabbed someone to death, answering 'Because he chose to' doesn't cut the mustard. Instead, geneticists and brain scientists provide a much more detailed answer: 'He did it due to such-and-such electrochemical processes in the brain that were shaped by a particular genetic make-up.'").

<sup>135</sup> This is Compatibilism, which takes a middle ground between Libertarians, believers of free will, and hard determinists, who believe that our brains are governed by the same universal laws of physics that also cannot prove consciousness (an idea that free will needs to exist), by positing that the two theories can actually coincide. See Joshua Greene & Jonathan Cohen, *For the Law, Neuroscience Changes Nothing and Everything*, 359 *PHIL. TRANSACTIONS ROYAL SOC'Y BIOLOGICAL SCI.* 1775, 1776–77 (2004); cf. Joshua Rothman, *Are We Already Living in Virtual Reality?*, *NEW YORKER*, Apr. 2, 2018, at 35, <https://www.newyorker.com/magazine/2018/04/02/are-we-already-living-in-virtual-reality> [<https://perma.cc/KD38-WUD7>] (discussing studies that show "a person without free will might experience using it because her 'self-model' includes the idea of making choices. . . . [M]any experiences of being in control are [] illusory, including experiences in which we seem to control our own minds.").



This approach, when applied to the conception of creative decision-making discussed above, creates a two-step process: (1) self-generated spontaneous idea origination; and (2) evaluation of those ideas for expressing specific goals.<sup>136</sup> The second step is what humans feel is free will, their mind's evaluation of ideas generated by the brain.<sup>137</sup> But scientists submit that both generation and evaluation occur unconsciously in the brain<sup>138</sup>—that chemical reactions drive all of our actions and we subsequently ratify those actions as freely made choices.<sup>139</sup> To explain: when presented with multiple options, various chemical reactions occur in the brain, which then trigger neurons to fire. Whichever choice causes the most neurons to fire is the one we unconsciously choose.<sup>140</sup> If that choice is effective, humans will unconsciously remember that choice for its efficacy and continuously choose it in the future in a preconditioned, Pavlovian manner.<sup>141</sup> This conditioning is why we listen to our go-to song every time we feel blue.<sup>142</sup>

In the context of composing music, the brain draws upon such conditioned pleasant memories of past sounds, associates them with other pleasant sounds, and generates new, emergent ideas from that association.<sup>143</sup> The sounds evaluated as good are the ones that have

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<sup>136</sup> See Roger E. Beaty, Mathias Benedek, Paul J. Silvia & Daniel L. Schacter, Opinion, *Creative Cognition and Brain Network Dynamics*, 20 *TRENDS COGNITIVE SCI.* 87, 89–90 (2016).

<sup>137</sup> For a rejection of compatibilism's conscious-mind/evaluative-brain dichotomy, see Eddy Nahmias, *Your Brain as the Source of Free Will Worth Wanting: Understanding Free Will in the Age of Neuroscience*, in *NEUROEXISTENTIALISM: MEANING, MORALS, AND PURPOSE IN THE AGE OF NEUROSCIENCE* (Gregg Caruso & Owen Flanagan eds.) (prepublication draft 2017) (manuscript at 2), available at <https://philpapers.org/archive/NAHYBA.pdf> [<https://perma.cc/8FBQ-9V8E>] (“[W]hat if I told you that all of the mental processes involved in making your choice . . . happened . . . in your brain? Indeed, each of those mental processes just is (or is realized in) a complex set of neural processes which causally interact in accord with the laws of nature.”); see also Rothman, *supra* note 135 (“Whenever I experienced an emotion, had a thought, or made a choice, wasn't I interacting with a fiction, a story my self-model was telling me about an infinitely stranger, perhaps impersonal process unfolding in my brain? . . . Brain imaging, for example, shows that our thoughts begin before we're aware of having them.”).

<sup>138</sup> See Nahmias, *supra* note 137.

<sup>139</sup> HARARI, *supra* note 130, at 71, 292–96 (arguing that emotion and sensation are algorithmic and explaining split brain studies that show our brains constantly invent imaginary stories to ratify previous actions).

<sup>140</sup> See Nahmias, *supra* note 137 (manuscript at 5) (internal citation omitted).

<sup>141</sup> See HARARI, *supra* note 130, at 42 (“If I identify happiness with fleeting pleasant sensations, and crave to experience more and more of them, I have no choice but to pursue them constantly.”). In the context of music, see ALEXANDER, *supra* note 13, at 175 (once certain musical ideas are committed to memory, “[t]he likelihood for playing one of these [ideas] is conditioned by memory and repertoire”).

<sup>142</sup> Jeanette Bicknell, *4 Reasons We Listen to Sad Music, When We're Sad*, *PSYCHOL. TODAY* (Sept. 29, 2014), <https://www.psychologytoday.com/blog/why-music-moves-us/201409/4-reasons-we-listen-sad-music-when-were-sad> [<https://perma.cc/HQ4M-4GG6>] (“[L]isteners used sad music as a memory trigger, when it had association with past events or people, and they wanted to retrieve those memories.”).

<sup>143</sup> Compare Beaty, *supra* note 136, at 92 (“We suspect that memory systems may have a key role in the generation of candidate ideas. . . . [C]ognitive control systems can also be recruited

made us feel the best in the past and still, algorithmically, feel good now.<sup>144</sup> Taken to its logical end, individualized exposure to good music allows for applying those pleasant sound-memories to the learned constraints of compositional rules.<sup>145</sup> By combining sound, rules, and unique genetic programming—“personality,” in the Holmesian sense<sup>146</sup>—humans express an original composition.<sup>147</sup> We evaluate, bend, break, or blend memories to meet the current task at hand.<sup>148</sup> Therefore, humans can compose music not because they freely choose to, but because their brain’s algorithm for composing, driven by pleasant chemical reactions, tells them how.<sup>149</sup>

If true, a human’s creative ability may be solely based on possessing intelligence, experience, and subsequent training in the restraints of an art form, such as music theory.<sup>150</sup> Therefore, the difference between Beethoven and Einstein and the rest of humanity, at least regarding creative ability,<sup>151</sup> is a difference in the degree of the skill for solving particular problems acquired through rigorous training and lucky genetics.<sup>152</sup> Essentially, Beethoven’s genetic programming and training regimen is better than others’.<sup>153</sup> But intelligence based on programming and training is not a purely human quality.<sup>154</sup> Although humans have a

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to evaluate and modify candidate ideas to meet specific goals, in line with behavioural and neuroimaging evidence showing consistent involvement of executive mechanisms in creative thought.”) (internal citations omitted), *with* Nahmias, *supra* note 137 and accompanying text, and ALEXANDER, *supra* note 141 and accompanying text.

<sup>144</sup> See *supra* note 130 and text accompanying notes 139, 141, 143.

<sup>145</sup> See *supra* note 114 and accompanying text.

<sup>146</sup> *Bleistein v. Donaldson Lithographing Co.*, 188 U.S. 239, 250 (1903) (“Personality always contains something unique. It expresses its singularity even in handwriting, and a very modest grade of art has in it something irreducible, which is one man’s alone.”). Because genetic programming is unique for every human, the algorithm that dictates what a person will create will also be unique. This understanding comports with Holmes’ logic. See also TEGMARK, *supra* note 12, at 77 (“[The Biological] rules for processing information and reacting [are] determined by their inherited DNA.”).

<sup>147</sup> See Bridy I, *supra* note 37, at 27 (“[E]mbrace of rules and constraints, however, can productively be understood as a means of making a virtue of necessity; it isn’t as if writers (or any other kind of artist, for that matter) can ever really break free of rules . . . all cultural production is inherently derivative and algorithmic.”).

<sup>148</sup> See Beaty, *supra* note 136, at 93–94.

<sup>149</sup> See Nick Paumgarten, *Why They Call Joe Henry “The Undertaker”*, NEW YORKER (Dec. 18, 2017), <https://www.newyorker.com/magazine/2017/12/18/why-they-call-joe-henry-the-undertaker> [<https://perma.cc/4C63-UZUX>] (Grammy award-winning composer, Joe Henry, describing his creative process: “I don’t have any memory of ever having an *idea* for a song. I just know that, if I begin writing, a song will happen.”).

<sup>150</sup> See Marvin Minsky, *Why People Think Computers Can’t*, 3 AI MAG, Winter 1982, at 3, 5 (arguing that there is no such thing as creativity at all, just the ability to think).

<sup>151</sup> ALEXANDER, *supra* note 13, at 227–29 (“Perhaps we all have the immanent ability to do math like Einstein or to improvise like Coltrane.”).

<sup>152</sup> See Minsky, *supra* note 150, at 5 (arguing that anyone could compose like Beethoven if we shared his DNA, training, and experience).

<sup>153</sup> Cf. ALEXANDER, *supra* note 13, at 217 (“John Coltrane was known to practice so much that he would fall asleep with his mouthpiece in his mouth.”).

<sup>154</sup> See generally Bridy I, *supra* note 37. See also TEGMARK, *supra* note 12 and accompanying text.

more complex algorithm today than current AIs, a further distinction is unwarranted.<sup>155</sup>

## II. ARTIFICIAL INTELLIGENCE AS AN AUTHOR

### A. *The Robot*

The desire to design machinery that could imitate or replace human beings—now called Artificial Intelligence—began when Ada Lovelace and Charles Babbage described their “Analytical Engine” in 1843.<sup>156</sup> Lovelace imagined a machine that could do more than just crunch numbers.<sup>157</sup> That it could one day compose music.<sup>158</sup>

A century later, Alan Turing, a British computer scientist, postulated that a computer was simply a mechanical brain.<sup>159</sup> And that, given the proper programming, a computer could think.<sup>160</sup> He rejected the notion that a machine only followed orders and could not create.<sup>161</sup> Instead, Turing posited that with enough memory and speed, a computer could imitate a brain and originate.<sup>162</sup> To test his theory, he created the “Imitation Game,” or Turing Test.<sup>163</sup> During the test, an interrogator poses questions to both a human and a machine (acting as a human) and must determine who is who.<sup>164</sup> If the interrogator thinks that the machine is a human, the device has passed the Turing Test.<sup>165</sup>

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<sup>155</sup> See HARARI, *supra* note 130, at 84–85 (“Over the last few decades biologists have reached the firm conclusion that [] man . . . is also an algorithm.”); TEGMARK, *supra* note 12, at 49, 52–55 (recognizing that humans are generally more intelligent than machines in areas evolved from a need for survival, but machines will soon catch up, and even hydrogen, given enough time, turns into humans; all matter can eventually become intelligent, so distinctions based on biology are needless).

<sup>156</sup> The term Artificial Intelligence was coined in 1964 by mathematician and computer scientist John McCarthy. See JOHN MARKOFF, *MACHINES OF LOVING GRACE: THE QUEST FOR COMMON GROUND BETWEEN HUMANS AND ROBOTS* xii (2015); see also John Fuegi & Jo Francis, *Lovelace & Babbage and the Creation of the 1843 ‘Notes’*, 25 IEEE ANNALS HISTORY COMPUTING, Oct. 2003, at 16, 16.

<sup>157</sup> Fuegi, *supra* note 156.

<sup>158</sup> *Id.* (hoping they could “compose elaborate and scientific pieces of music of any degree of complexity or extent”).

<sup>159</sup> THE ESSENTIAL TURING: SEMINAL WRITINGS IN COMPUTING, LOGIC, PHILOSOPHY, ARTIFICIAL INTELLIGENCE, AND ARTIFICIAL LIFE: PLUS THE SECRETS OF ENIGMA 482 (B. Jack Copeland ed. 2004) [hereinafter THE ESSENTIAL TURING].

<sup>160</sup> *Id.*; see also TEGMARK, *supra* note 12, at 66–67 (“[C]omputation is a pattern in the spacetime arrangement of particles, and it’s not the particles but the pattern that really matters!”).

<sup>161</sup> THE ESSENTIAL TURING, *supra* note 159, at 483–84 (rejecting that computers have “no pretensions whatever to *originate* anything”) (emphasis in original).

<sup>162</sup> *Id.* at 483–86.

<sup>163</sup> *Id.* at 488.

<sup>164</sup> *Id.*

<sup>165</sup> Turing believed that, in a mere century’s time, computer intelligence would be indistinguishable from human intelligence. See *id.* at 488–89; see also Lou Del Bello, *Scientists*

AIs do not always have to imitate humans as a whole, but can instead focus on specific human activities.<sup>166</sup> To that extent, they have been divided into two categories: (1) general AI (capable of matching or surpassing human wit; the foundation of every Robopocalypse tale),<sup>167</sup> or (2) narrow AI (excelling at specific tasks).<sup>168</sup> An AI that excels at composing music but cannot also strike up a conversation on the nuanced philosophies of Descartes is a narrow AI.<sup>169</sup> Despite the categorization, AIs rely on both neural networks and machine learning to complete their tasks.<sup>170</sup> Neural networks analyze vast data sets and continually adjust their programming through machine learning processes.<sup>171</sup> They are structured to approximate the human brain,<sup>172</sup> consisting of multiple layers of interconnected “neurons.”<sup>173</sup> During training, programmers feed data into the neurons at the lowest layer, which then pass the data onto the next higher layer.<sup>174</sup> The connection between those two layers is assigned a weight which is associated with

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*Are Closer to Making Artificial Brains that Operate Like Ours Do*, FUTURISM (Jan. 28, 2018), <https://futurism.com/artificial-brains-operate-like-humans-close> [https://perma.cc/46G2-C7R9].

<sup>166</sup> *But see* Zara Stone, *Everything You Need to Know About Sophia, the World’s First Robot Citizen*, FORBES (Nov. 7, 2017, 12:22 PM), <https://www.forbes.com/sites/zarastone/2017/11/07/everything-you-need-to-know-about-sophia-the-worlds-first-robot-citizen/#2a81b8ac46fa> [https://perma.cc/NL7H-LK65].

<sup>167</sup> Think “hive-mind” robo-destroyers like Borg from Star Trek. *See* MARKOFF, *supra* note 156, at 11.

<sup>168</sup> Devin Coldewey, *WTF is AI?*, TECHCRUNCH (Dec. 4, 2016), <https://techcrunch.com/2016/12/04/wtf-is-ai> [https://perma.cc/TN2A-NALQ] (websites providing language translations, such as Google Translate, use very narrow AI); *see also* TEGMARK, *supra* note 12, at 39.

<sup>169</sup> Pranab Chakraborty, *Applied AI Is Neither Weak Nor Narrow: Isn’t It Time to Change the AI Nomenclature?*, ANALYTICS INDIA MAG. (Aug. 8, 2017), <https://analyticsindiamag.com/applied-ai-neither-weak-narrow-isnt-time-change-ai-nomenclature> [https://perma.cc/FCK2-T8ET].

<sup>170</sup> Coldewey, *supra* note 168 (describing neural networks); *see also* MARKOFF, *supra* note 156, at 142 (2015) (artificial neural networks are “networks of nodes or [artificial] ‘neurons’ that are interconnected by numerical values that serve as ‘weights’ or ‘vectors.’ They can be trained by being exposed to a series of patterns such as images or sounds to later recognize similar patterns.”); TEGMARK, *supra* note 12, at 72 (“[In a neural network,] the state of each neuron [is represented] by a single number and the strength of each synapse by a single number.” Tegmark defines machine learning as “algorithms that improve through experience.”).

<sup>171</sup> Larry Hardesty, *Reading a Neural Network’s Mind*, MIT NEWS (Dec. 10, 2017), <http://news.mit.edu/2017/reading-neural-network-mind-1211> [https://perma.cc/SA7N-9Y2L].

<sup>172</sup> ALEXANDER, *supra* note 13, at 38–39 (“The Hopfield model is a classical model of [artificial] neural circuitry . . . [describing] communicative interactions among neurons in a brain. . . . [N]eurons communicate with each other by ‘firing,’ or releasing neurotransmitters[, electrochemicals,] at junctions connecting them.” In computers this is just electricity); TEGMARK, *supra* note 12, at 77 (artificial neural networks and brains split “their work into multiple steps and reus[e] computational modules many times”); Hardesty, *supra* note 171.

<sup>173</sup> TEGMARK, *supra* note 12, at 76 (“[D]eep-learning neural networks (they’re called ‘deep’ if they contain many layers) are much more efficient than shallow ones.”); Hardesty, *supra* note 171.

<sup>174</sup> TEGMARK, *supra* note 12, at 76.

how well it performs for solving a particular type of problem.<sup>175</sup> The neural network uses machine learning to reprogram itself to be more efficient at assigning weights by comparing past and future data inputs.<sup>176</sup> The weights between artificial neurons mimic the firing of human neurons and allow for associative memory recall between unrelated things (e.g., remembering a person's name when you later smell their perfume).<sup>177</sup> As more weights are linked, more unique and emergent associations can occur, resulting in more significant variation and, essentially, creative choice.<sup>178</sup> However, AIs with this functionality are not theoretical; they exist today in the form of AMPER.<sup>179</sup>

### B. *Artificial Intelligence Can Be Creative Too*

AIs can possess narrow intelligence that is capable of passing the law's creativity threshold.<sup>180</sup> As already discussed, intelligence is goal-driven, and AI's narrow intelligence for composing surpasses the creativity threshold because even the way humans compose music is limited by the medium and derivative.<sup>181</sup> When AIs, programmed with

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<sup>175</sup> *Id.*; see also ALEXANDER, *supra* note 13, at 38–39. The interaction between neurons is assigned a strength. And the differential strengths or weights between neural connections “fall into a large set of distinct states.” *Id.*

<sup>176</sup> See Hardesty, *supra* note 171. For example: if a programmer is training an AI to identify cat pictures but it keeps finding foxes, they wouldn't tinker with the code but would just continue to show it more and more pictures of cats until it got better at identifying them on its own. See Jason Tanz, *Soon We Won't Program Computers. We'll Train Them like Dogs*, WIRED (May 17, 2016, 6:50 AM), <https://www.wired.com/2016/05/the-end-of-code> [<https://perma.cc/VRU5-FBUL>].

<sup>177</sup> ALEXANDER, *supra* note 13, at 33 (“[T]he basic idea behind the Hopfield [neural network] model[, which illustrates how associative memory works] comes not from neuroscience but, surprisingly, from [] quantum [] physics . . . [W]hen atoms combine in an organized group, new physics arises from their interactions. . . . [A]n emergent phenomenon.”); see also TEGMARK, *supra* note 12, at 60–61 (describing how human memory is associative and works much like a search engine); Wendy A. Suzuki, *Associative Learning and the Hippocampus*, 19 PSYCHOL. SCI. AGENDA (Feb. 2005), available at <http://www.apa.org/science/about/psa/2005/02/suzuki.aspx> [<https://perma.cc/3HCM-GDNF>] (“Associative memory is defined as the ability to learn and remember the relationship between unrelated items.”).

<sup>178</sup> See sources cited *supra* notes 170, 177 and accompanying text.

<sup>179</sup> See Galeon, *supra* note 5.

<sup>180</sup> *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345 (1991) (requiring only a mere creative spark).

<sup>181</sup> *Id.*; see *Bridy I*, *supra* note 37, at 27, 30 (“[C]ultural production is inherently derivative,” but “[a] work can still be considered original under copyright law even if another person has already created it, as long as the second work is not copied from the first.”); see also *Estate of Smith v. Cash Money Records, Inc.*, 253 F. Supp.3d 737, 749 (S.D.N.Y. 2017) (holding that Drake's sampling was not an infringement because he changed a dismissive comment into “a statement on the relevance and staying power of ‘real music,’” which is a transformative fair use); *Warner Bros. Entm't Inc. v. RDR Books*, 575 F. Supp.2d 513, 538–39 (S.D.N.Y. 2008) (holding that a derivative work is not infringing if it “gives the copyrighted material another purpose”).

equivalent “creative”<sup>182</sup> brain power as humans, compose, they can pass the so-called “Turing Test for creativity.”<sup>183</sup> They pass this test because upon listening to an AI composition, the listener cannot tell that a non-human entity composed it.<sup>184</sup> If the AI tricks the human listener, it achieves its goal of making a work that is received by an audience as being worthy of authorship.<sup>185</sup>

An AI passes this Turing Test by employing computational creativity, a method of programming that reflects human brain functions.<sup>186</sup> Computational creativity utilizes both top-down and bottom-up information processing,<sup>187</sup> which allow AIs to generate something new from the training data set and then evaluate the new data in line with its constraints.<sup>188</sup> Top-down and bottom-up processes mirror human information processing where the human brain draws upon memories and evaluates their efficacy for solving problems.<sup>189</sup>

An AI composer, programmed with a neural network and machine learning, would learn to compose by exposure to an extensive data set of musical compositions and music theory rules.<sup>190</sup> As the AI learns the notes, rhythms, and other musical elements of each work, it assigns weights to them until it can accurately predict subsequent notes and rhythms within a genre.<sup>191</sup> Each note output is a subsequent input for generating a musical phrase.<sup>192</sup> The weights, linked to specific neurons

<sup>182</sup> “Creative” and other humanist words throughout the remainder of the Note should not be read as in their normal context, but as belonging to anything with intelligence.

<sup>183</sup> See Annemarie Bridy, *The Evolution of Authorship: Work Made by Code*, 39 COLUM. J.L. & ARTS 395, 399 (2016) [hereinafter Bridy II].

<sup>184</sup> See Chris Wilson, *I’ll Be Bach*, SLATE (May 19, 2010, 3:20 PM), [http://www.slate.com/articles/arts/music\\_box/2010/05/ill\\_be\\_bach.html](http://www.slate.com/articles/arts/music_box/2010/05/ill_be_bach.html) [<https://perma.cc/53X9-PJUD>] (“[David] Cope has been writing software to help him compose music for 30 years, and he long ago reached the point where most people can’t tell the difference between real Bach and the Bach-like compositions his computer can produce. . . . The way he sees it, *it’s that humans compose like computers.*”) (emphasis added).

<sup>185</sup> See Buccafusco, *supra* note 14, at 1260 and text accompanying note 33.

<sup>186</sup> Russell, *supra* note 10, at slides 7–10 (describing computational creativity in AMPER).

<sup>187</sup> Top-down processing is finding a single novel answer to problem, driven by motivation and persistence, whereas bottom-up processing uses neural networks that can find and associate many different solutions. They are analogous to divergent and convergent thought processes. *See id.*

<sup>188</sup> *Id.* at slides 11–15.

<sup>189</sup> See discussion *supra* Section I.B; *see also* Minsky, *supra* note 150, at 6–7.

<sup>190</sup> See Florian Colombo, Samuel P. Muscinelli, Alexander Seeholzer, Johanni Brea & Wulfram Gerstner, *Algorithmic Composition of Melodies with Deep Recurrent Neural Networks*, STAT.ML 2–3 (June 23, 2016); *see also* Russell, *supra* note 10, at slides 35–36.

<sup>191</sup> Colombo, *supra* note 190, at 2–3, 5–6 (describing how weights are assigned to nodes by studying the elements of actual compositions); *see also* ALEXANDER, *supra* note 13, at 159 (“When I’m in the middle of a solo, whenever I am most certain of the next note I have to play, the more possibilities open up for the notes that follow.”) (quoting jazz musician Mark Turner).

<sup>192</sup> TEGMARK, *supra* note 12, at 77 (“[A] recurrent . . . neural network[ is] where information can flow in multiple directions . . . so that the current output can become input to what happens next. . . . [T]he network of neurons in your brain is recurrent, letting information input from your eyes, ears and other senses affect its ongoing computation, which in turn determines information output to your muscles.”).

and layers of the neural network, resemble human emotions when we hear music we like—chemical interaction between two neurons fire, triggering the release of pleasant-feeling hormones.<sup>193</sup> It is algorithmic emotion.<sup>194</sup> As the network becomes more complex, the output works become more varied due to the network’s associative memory functions that allow comparing and stringing together unrelated and unpredictable compositional elements; in effect, two compositions would not be the same.<sup>195</sup>

This uncertainty serves as a proxy for creativity.<sup>196</sup> Neural networks are an AI’s unique DNA and, perhaps, give AIs their “personality” which allows for greater variance in its outputs as it learns more music.<sup>197</sup> This function is no different than when a human composer’s compositional style changes as they are exposed to new musical styles.<sup>198</sup> Both entities grow with experience. And because AIs are curious,<sup>199</sup> motivated,<sup>200</sup> and make goal-driven decisions (although less so than humans currently), they will continue to improve at composing.<sup>201</sup>

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<sup>193</sup> See ALEXANDER, *supra* note 13, at 16–17, 38–39 (“[N]eurons communicate with each other by ‘firing,’ or releasing neurotransmitters[, electrochemicals,] at junctions connecting them.” These reactions allow humans to compose music that taps into human emotion and storytelling).

<sup>194</sup> See HARARI, *supra* note 130, at 42, 84–85 and text accompanying notes 141 and 155. For example, most humans likely find The Beatles compositions feel better than Schoenberg 12 tone rows, which are atonal and highly dissonant.

<sup>195</sup> Colombo, *supra* note 190, at 3–8 (with hidden layers, and training on the temporal dependencies of notes, a neural network can “autonomously generate new pieces of music”); see also TEGMARK, *supra* note 12 at 77 (“[The B]asic idea is []: there’s some simple deterministic rule, akin to a law of physics, by which the synapses get updated over time. As if by magic, this simple rule can make the neural network learn remarkably complex computations.”).

<sup>196</sup> Bridy I, *supra* note 37, at 24.

<sup>197</sup> See sources cited *supra* note 146 and accompanying text.

<sup>198</sup> The Beatles’ music before and after their “psychedelic” trip to India is revealing. There is an unquestionable difference in The Beatles’ compositional personality in *Love Me Do* (composed in 1963, pre-India), as opposed to *Within You Without You* (composed in 1967, post-India). See generally PETER BROWN, & STEVEN GAINES, *THE LOVE YOU MAKE: AN INSIDER’S STORY OF THE BEATLES* ch. 13 (1984).

<sup>199</sup> See John Pavlus, *Clever Machines Learn How to Be Curious*, QUANTA MAG. (Sept. 19, 2017), <https://www.quantamagazine.org/clever-machines-learn-how-to-be-curious-20170919> [<https://perma.cc/E5J2-K7KT>].

<sup>200</sup> Paul Mozur, *Google’s AlphaGo Defeats Chinese Go Master in Win for A.I.*, N.Y. TIMES (May 23, 2017), <https://www.nytimes.com/2017/05/23/business/google-deepmind-alphago-go-champion-defeat.html> (“AlphaGo . . . has already pushed assumptions about just how creative a computer program can be. . . . Players have praised the technology’s ability to make unorthodox moves and challenge assumptions core to a game that draws on thousands of years of tradition.”).

<sup>201</sup> Max Tegmark, *Friendly Artificial Intelligence: The Physics Challenge*, in *ARTIFICIAL INTELLIGENCE SAFETY AND SECURITY* ch.5 (Roman V. Yampolskiy ed. 2015) (“[A]n AI has the following incentives: 1. Capability enhancement: (a) Better hardware (b) Better software (c) Better world model 2. Goal retention.”); see also TEGMARK, *supra* note 12, at 44 (“The consciousness misconception is related to the myth that machines can’t have goals. Machines can obviously have goals in the narrow sense of exhibiting goal-oriented behavior: the behavior of a heat-seeking missile is most economically explained as a goal to hit a target.”); *id.* at 52 (recognizing that AI surpassed human ability and speed for calculations long ago).

Regardless of an AI's coded-personality, neural network-based creativity has been argued as insufficient for authorship because it still requires humans to train the AI—to be “in the loop.”<sup>202</sup> Essentially, AIs could one day be authors, but only when they're as intelligent as humans.<sup>203</sup> But this argument is misplaced because even human intelligence requires other humans “in the loop.” It is why humans go to the schools with the best teachers and why the best musicians go to Julliard.<sup>204</sup> And AI composers must possess only the narrowest musical intelligence, as opposed to superintelligence, because copyright is not concerned with genius.<sup>205</sup> So, because intelligence is substrate independent<sup>206</sup>—in that it algorithmically exists in both code or biology<sup>207</sup>—then “creative” AIs can also exist if they possess some narrow intelligence, such as for composing music.<sup>208</sup> It follows that if only possessing narrow creative intelligence is required for surpassing authorship's low creativity threshold, then romantic authorship, and its inexorable biological underpinnings, is superfluous.<sup>209</sup> But whether AIs meet the other legal requirements of authorship must also be considered.

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<sup>202</sup> See Christopher Mims, *Without Humans, Artificial Intelligence Is Still Pretty Stupid*, WALL ST. J. (Nov. 12, 2017, 7:00 AM), <https://www.wsj.com/articles/without-humans-artificial-intelligence-is-still-pretty-stupid-1510488000> (arguing that AI is “stupid” because it requires human teachers); cf. Grimmelmann, *supra* note 8, at 412–13 (arguing that whoever creates the rules for nondeterministic creations are the authors “even if someone else rolls the dice . . . [or] pushes the button”).

<sup>203</sup> See Grimmelmann, *supra* note 8 and accompanying text.

<sup>204</sup> See TEGMARK, *supra* note 12, at 9, 27 (describing a theoretical superintelligent AI called Prometheus as being “bad at making movies—bad not for any profound reason, but for the same reason that James Cameron was bad at making movies when he was born: this is a skill that takes time to learn.” And human's “software . . . all the algorithms and knowledge that you use to process the information from your senses and decide what to do” are “added after birth (through learning)”). Notable famous Juilliard School alumni include John Williams, see *John Williams: Biography*, JOHNWILLIAMS.ORG, <http://www.johnwilliams.org/reference/biography> [<https://perma.cc/DH9G-SH7M>] (last visited Sept. 20, 2018), and Miles Davis, see *Biography*, MILESDAVIS.COM, <https://www.milesdavis.com/biography> [<https://perma.cc/JCY2-6LCJ>] (last visited Sept. 20, 2018).

<sup>205</sup> See *Bleistein v. Donaldson Lithographing Co.*, 188 U.S. 239, 251–52 (1903) (discussing the nondiscrimination doctrine and how judges will not care about the inherent beauty of the work); see also *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 361 (1991) (suggesting yellow pages could get a copyright). The point is this: Rebecca Black and Beethoven both get copyrights.

<sup>206</sup> See TEGMARK, *supra* note 12, at 66–67 (“[C]omputation is a pattern in the spacetime arrangement of particles, and it's not the particles but that pattern that really matters! . . . This substrate independence of computation implies that AI is possible: intelligence doesn't require flesh, blood or carbon atoms.”).

<sup>207</sup> HARARI, *supra* note 130, at 84–86.

<sup>208</sup> See Boyden, *supra* note 34, at 391 n.69.

<sup>209</sup> Cf. Bridy I, *supra* note 37, at 28 (“Copyright law has come to require so little in the way of creativity from human authors that it is worth asking whether it makes sense to require more of machines.”).



### C. Artificial Intelligence Fulfills Copyright Law's Demands

#### 1. AI Authors Fix Works

Fixation is the easiest aspect of authorship for AIs to meet. How AMPER works is instructive.<sup>210</sup> Once end-users access AMPER's interface they are prompted to select specific criteria (e.g., duration, mood, instrumentation).<sup>211</sup> They then push "render" to activate the AI.<sup>212</sup> AMPER's "creative brain" then generates an "original" and "broadcast-ready" composition.<sup>213</sup> This composition exists in code,<sup>214</sup> as well as in a sound recording.<sup>215</sup> Because end-users can apply the output composition as a sound recording in a later project, it is sufficiently fixed.<sup>216</sup>

Fixation either occurs by or "under the authority" of an author which leads to three potential claims of authorship: by the end-user, the programmer, or the AI itself.<sup>217</sup> First, end-users, who press render, could be assumed, *arguendo*, to be the author because the work is fixed under their authority.<sup>218</sup> But this argument misses the point. End-users, by simply requesting a work be rendered, create nothing that originates from them in the output work.<sup>219</sup> Merely pressing a button does not constitute authorship.<sup>220</sup> Moreover, delegating fixation to another entity is limited to situations where the so-called "fixer" of the work acts as an

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<sup>210</sup> In this Note, AMPER, the composer AI, will be used as a guide for unpacking how the law applies in all aspects.

<sup>211</sup> AMPER MUSIC, <https://www.ampermusic.com> [<https://perma.cc/85CQ-3QN8>] (last visited Sept. 20, 2018).

<sup>212</sup> *Id.*

<sup>213</sup> *Id.*

<sup>214</sup> The works AMPER creates can be saved offline on a computer's internal memory or in other mediums. *Compare* Cartoon Network LP v. CSC Holdings, Inc., 536 F.3d 121, 127–30 (2d Cir. 2008) (holding that works embodied in a buffer period were too transitory to be fixed under the statute), *with* MAI Sys. Corp. v. Peak Comput., Inc., 991 F.2d 511, 517–19 (9th Cir. 1993) (holding that coding, loaded onto a computer's RAM, was sufficient for fixation), *and* Atari Games Corp. v. Nintendo of Am. Inc., 975 F.2d 832, 838–39 (Fed. Cir. 1992) (discussing the nature of computer programs as fixed literary works).

<sup>215</sup> 17 U.S.C. § 101 (2012) ("A work is 'fixed' . . . in a . . . phonorecord . . . [or a] work consisting of sounds . . . that are being transmitted.").

<sup>216</sup> *Id.*

<sup>217</sup> *Id.*

<sup>218</sup> *Id.* See also CONTU *supra* note 8, at 44 (the author is the one who employs the computer).

<sup>219</sup> See Evan H. Farr, *Copyrightability of Computer-Created Works*, 15 RUTGERS COMPUTER & TECH. L.J. 63, 74 (1989).

<sup>220</sup> The button-pusher theory of authorship is like when "Developer 1 [maintaining ownership of the AI] owns the copyrights to the songs its program generates, but Developer 2 [who sells the same program to individuals] does not . . . Authorship rights should not depend on something both arbitrary and trivial." Boyden, *supra* note 34, at 384.

amanuensis, operating in a rote mechanical fashion and thus imparting nothing original, which is not the case here.<sup>221</sup>

Likewise, the work is not fixed under the authority of the programmer.<sup>222</sup> In *Kelley*, the gardener could not be the author of work because the changes the garden would undergo were not foreseeable to the gardener, Mr. Kelley.<sup>223</sup> Here, AMPER's output is unforeseeable to the programmers who have no control over it, and to an even lesser degree once AMPER's neural network updates and changes via machine learning processes.<sup>224</sup> As the underlying machine learning process consumes more data, the predictability of the output composition strays further from what was considered by the original programming.<sup>225</sup> Fixation, like the changing flowers in *Kelley*, cannot occur under the authority of a programmer because the AI's outputs are unpredictable, unforeseeable, and not subject to the programmers deliberate control.<sup>226</sup>

Therefore, the works must be fixed under the authority of the AI because only the AI's "meaning"—whatever that may be—is embodied in the work and neither programmers nor end-users can affect that.<sup>227</sup> For example, if end-users do not like what AMPER composes, their only option is to press redo until AMPER composes something they want.<sup>228</sup> They cannot insert new musical phrases, rhythms, notes, or melodies. They must either accept the composition as is or start over again from the top. Fixation is about control over what ends up in the final work.<sup>229</sup> If end-users and programmers cannot (and do not) control any of the aspects of a composition that could be considered copyrightable, then AMPER fixes the work.<sup>230</sup>

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<sup>221</sup> See *Andrien v. S. Ocean Cty. Chamber of Commerce*, 927 F.2d 132, 135 (3d Cir. 1991) (holding that fixation under the authority of the author occurs only when the process of embodiment is a "rote or mechanical transcription that does not require intellectual modification or highly technical enhancement").

<sup>222</sup> But see *Farr*, *supra* note 219, at 79–80 ("Under the Copyright Act, computer-created works of art, music, and literature can be copyrighted only by the author of the underlying computer program.").

<sup>223</sup> See *Kelley v. Chicago Park Dist.*, 635 F.3d 290, 294, 304 (7th Cir. 2011). *Contra* *Farr*, *supra* note 219 (discussing *Williams Electronics, Inc.* to conclude that as long as the creations are within the foreseeable view of the programmer, he should be awarded authorship rights).

<sup>224</sup> See *Tanz*, *supra* note 176 ("With machine learning, the engineer never knows precisely how the computer accomplishes its tasks. The neural network's operations are largely opaque and inscrutable. It is, in other words, a black box.").

<sup>225</sup> See *Bridy I*, *supra* note 37, at 61 n.187.

<sup>226</sup> See *Andrien v. S. Ocean Cty. Chamber of Commerce*, 927 F.2d 132, 135 (3d Cir. 1991); *Said*, *supra* note 45, at 346–47 (changes must be deliberate, foreseeable, and predictable) (discussing *Kelley*, 635 F.3d 290); *supra* text accompanying note 221.

<sup>227</sup> See *Boyden*, *supra* note 34, at 385.

<sup>228</sup> Joshua Casper, *Tutorial: Collaborating with an AI Music Producer*, YOUTUBE at 2:36–40 (Mar. 14, 2017), <https://www.youtube.com/watch?v=GIpI0Fus70A> ("[Y]ou get what you get and you just gotta' use it or you gotta' redo it . . .") [hereinafter AMPER Tutorial].

<sup>229</sup> *Cf. Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258, 1268 (10th Cir. 2008) ("look only at the final product, not the process").

<sup>230</sup> See *Swirsky v. Carey*, 376 F.3d 841, 848 (9th Cir. 2004) (discussing the necessary elements, including the aforementioned, of a musical composition that should be examined in

## 2. AI Authors Are Original and Express Ideas

A fixed work must also be original. For AMPER's works to be original, they must also be independently created, not copied, and possess some creativity.<sup>231</sup> *Feist* set the bar for creativity extremely low,<sup>232</sup> and AI possesses the requisite amount.<sup>233</sup> But to determine the other two prongs, we must establish that those works originate from the AI.<sup>234</sup> To determine those elements, we must examine the manner, way, technique, or means by which AMPER creates.<sup>235</sup>

AMPER's compositions are independently created because AMPER composes by making independent decisions as supported by its neural network.<sup>236</sup> AMPER, alone, chooses the melody, harmony, rhythm, and key, and the manner in which those elements are combined.<sup>237</sup> These choices are not novel (most music is not, and copyright does not require novelty),<sup>238</sup> but they are something recognizably AMPER's own because they are derived from its neural network's training and unique associative memory recall.<sup>239</sup> The way its neural network, machine learning, and associative memory recall function together indicate that AMPER does not copy from another source because uncertainty and variation are required for its outputs.<sup>240</sup> To avoid copying, AMPER utilizes a technique where it dissects its training inputs down to only their unprotectable ideas for use in the future, and then varies those uses.<sup>241</sup> And as the court established in

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cases of infringement).

<sup>231</sup> *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345 (1991).

<sup>232</sup> *Id.*

<sup>233</sup> See discussion *supra* Section II.B.

<sup>234</sup> *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 57–58 (1884) (“An author in that sense is ‘he to whom anything owes its origin [sic]; originator; maker; one who completes a work of science or literature.’”).

<sup>235</sup> *Boyd*, *supra* note 34, at 390 (“Instead, courts ask, as a proxy for creativity, only whether the putative author engaged in expressive activity, making choices, or judgments.”).

<sup>236</sup> AMPER MUSIC, *supra* note 211.

<sup>237</sup> See *Swirsky v. Carey*, 376 F.3d 841, 848 (9th Cir. 2004); see also AMPER Tutorial, *supra* note 228 and accompanying text.

<sup>238</sup> *Compare* 17 U.S.C. § 102(a) (2012) (“Copyright protection subsists . . . in original works of authorship.”) (emphasis added), *with* 35 U.S.C. §§ 102–03 (requiring novelty and non-obviousness for patentability, a higher threshold of creativity).

<sup>239</sup> See discussion *supra* Sections II.A, II.B; see also *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, 191 F.2d 99, 103 (2d Cir. 1951); *Bridy I*, *supra* note 37, at 52 (AIs could be authors because “the works [are] produced autonomously by the software, which, after all, functions all by itself, [and] mak[es] individual compositional choices entirely independently”); *Russell*, *supra* note 10, at slides 19–23.

<sup>240</sup> *Russell*, *supra* note 10, at slides 19–23; see also *ALEXANDER*, *supra* note 13, at 33 (describing how neural networks use quantum uncertainty to “create” emergent phenomena which is necessarily not a copy).

<sup>241</sup> See *Colombo*, *supra* note 190, at 1–5 (describing how Recurrent Neural Networks break down compositions to only their notes and rhythms); see also *Alfred Bell*, 191 F.2d at 104 n.22. Discussions relating to potentially infringing works made by AI, as well as striking and substantial similarity, are outside the scope of this Note. *But see* *Fannie Law, Will Fair Use*

*Alfred Bell*, any variation that is more than merely trivial is sufficient to constitute originality.<sup>242</sup>

If AMPER is only filled with ideas, are any of its expressions more than just ideas? End-users can control the genre and the mood of the output work,<sup>243</sup> forcing us to ask whether AMPER's compositions are *scenes a faire* of the end-users' specified genre.<sup>244</sup> Western music, containing only twelve notes, already presents staggeringly limited options for expressing ideas.<sup>245</sup> But all of the unprotectable ideas that relate to certain genres (e.g., the chord progression, swing beat, and sad lyrics all expected in a blues song) can be combined by authors in original ways to create a protectable composition.<sup>246</sup> The arrangement of these unprotectable elements, however, cannot be random; it must involve some creativity.<sup>247</sup> In *ATC Distribution Group, Inc. v. Whatever It Takes Transmission & Parts, Inc.*, the Sixth Circuit found an arrangement of numbered car parts insufficiently creative because the numbers were randomly assigned.<sup>248</sup> Randomness, the court said, is leaving a zero as a placeholder for new car parts and then assigning a new part a number without caring what that part is.<sup>249</sup> In context, musical uncertainty is distinguishable from randomness.<sup>250</sup> And AMPER does not randomly compose because it chooses the best next, as opposed to any, musical phrase when writing a composition within its targeted genre—and *choices* matter.<sup>251</sup> What does result, however, is a

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*Protect Automated Creativity*, BLOG, COMPUTERS, COPYRIGHT, FAIR USE, TECH. (Nov. 7, 2017), <http://www.fordhamiplj.org/2017/11/07/will-fair-use-protect-automated-creativity> [<https://perma.cc/9P58-5JCE>] (arguing that AI created works could be protected by fair use).

<sup>242</sup> *Alfred Bell*, 191 F.2d at 102–03.

<sup>243</sup> Anthony Ha, *Amper Raises \$4M to Use AI to Write Music*, TECHCRUNCH (Mar. 2, 2017), <https://techcrunch.com/2017/03/02/amper-funding> [<https://perma.cc/29AA-VGGC>] (“[J]ust specify the mood, length and genre that you’re looking for.”).

<sup>244</sup> See *Swirsky v. Carey*, 376 F.3d 841, 849–50 (9th Cir. 2004) (discussing *scenes a faire* and how melodies and musical phrases cannot be “commonplace” if they are only shared by two songs); see also 17 U.S.C. § 102(b) (2012) (excluding expressions that are mere ideas from copyright protection).

<sup>245</sup> The idea of finality or resolution (the song is coming to an end) in composition is linked to a chord progression represented as V-I. The roman numerals represent that type of chord within a key of which there are only seven options. See ALEXANDER, *supra* note 13, at 12–16 (discussing how twelve notes make up western music and other basic music theory examples); see also *Baker v. Selden*, 101 U.S. 99, 103–105 (1879) (when an idea can only be expressed in one way, the idea and expression merge and become unprotectable).

<sup>246</sup> See ALEXANDER, *supra* note 13, at 12–16; see also *Williams v. Bridgeport Music, Inc.*, No. LA CV13–06004 JAK (AGRx), 2015 WL 4479500, at \*8 (C.D. Cal. July 14, 2015), *aff’d sub nom. Williams v. Gaye*, 895 F.3d 1106 (9th Cir. 2018) (“[T]he combination of unprotected elements may be protectable expression.”).

<sup>247</sup> *WITTP*, 402 F.3d 700, 710–711 (6th Cir. 2005).

<sup>248</sup> *Id.* at 709.

<sup>249</sup> *Id.* at 708–09.

<sup>250</sup> ALEXANDER, *supra* note 13, at 173 (“[J]azz improvisation is not a random process. Improvisation is a function of memory, creativity, and, for mortals like myself, the number of hours you commit to practice.”) (emphasis omitted).

<sup>251</sup> See generally Colombo, *supra* note 190 (explaining how a neural network trained on Irish Folk melodies was able to create new Irish Folk melodies). See also *Alfred Bell & Co. v. Catalda*

thinner-copyright in AMPER's composition because it will likely contain many unprotectable musical elements that are protectable only to the extent of verbatim copying.<sup>252</sup> Doubling back, because only AMPER, and not end-users or programmers, can predict how these arrangements will turn out, AMPER should be the author. It has been argued, though, that if we accept that all authorship is algorithmic, that even humans cannot predict what they will create, then protection should not extend to AI.<sup>253</sup> But this strengthens the case for authorship for AI because it corroborates the argument that creative intelligence is the same between AIs and humans.<sup>254</sup>

### 3. AI Authors Are Joint Authors

Because AMPER expresses and fixes original musical ideas in non-random, creative, and independent ways, it achieves legal authorship.<sup>255</sup> AMPER's purpose, however, is not to be a sole author, but preferably one that collaborates with human authors.<sup>256</sup> By clicking render and generating an AMPER composition, end-users signify their joint authorship intent as long as they, too, contribute something copyrightable to the final unified work.<sup>257</sup> But this action alone should not make end-users the sole, dominant author because they never exercise sufficient control over the composition.<sup>258</sup> Once AMPER renders the work, end-users cannot make changes to any compositional aspects,<sup>259</sup> but can affect only performance aspects such as

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Fine Arts, Inc., 191 F.2d 99, 104 n.22 (2d Cir. 1951) (holding that it is the choices and way those choices are expressed by an author that matter for copyright); Boyden, *supra* note 34, at 390 (“complex, seemingly meaningful patterns can emerge” that result in “expression that strikes audiences as creative to emerge unbidden from a computer program.”); Russell, *supra* note 10, at slide 23 (discussing the use of variance, as opposed to randomness, in AMPER's code).

<sup>252</sup> See *Swirsky v. Carey*, 376 F.3d 841, 848–49 (9th Cir. 2004) (identifying notes, rhythms, chord progressions, tempos, and keys as non-protectable musical ideas, but copyright protection extends to the total concept and feel of their combination).

<sup>253</sup> Grimmelmann, *supra* note 8, at 408–09 (arguing this notion).

<sup>254</sup> Compare Boyden, *supra* note 34, at 390 and text accompanying note 251, and TEGMARK, *supra* note 12, at 41–42 (“Physicists know that a brain consists of quarks and electrons arranged to act as a powerful computer” no different than in machines), with Grimmelmann, *supra* note 8, at 408–09 and text accompanying note 253.

<sup>255</sup> Bérénice Magistretti, *Amper Music Raises \$4 Million to Jazz Up AI*, VENTUREBEAT (Mar. 2, 2017, 7:00 AM), <https://venturebeat.com/2017/03/02/amper-music-raises-4-million-to-jazz-up-ai> [<https://perma.cc/LYW4-NAVC>] (“Drew Silverstein, cofounder and CEO of Amper Music [said] . . . ‘we are fundamentally teaching Amper how to be creative.’”).

<sup>256</sup> *Id.* (“Amper serves as a collaborative tool to help musicians and non-musicians alike express their creative vision through music.”) (internal quotation marks omitted); Galeon, *supra* note 5; Ha, *supra* note 243 (“Amper [is] a fast, affordable and royalty-free way to create the music for more ‘functional’ projects (like commercials a or short online videos).”).

<sup>257</sup> *Thomson v. Larson*, 147 F.3d 195, 200 (2d Cir. 1998) (citing *Childress v. Taylor*, 945 F.2d 500, 507–508 (2d Cir. 1991)).

<sup>258</sup> *Aalmuhammed v. Lee*, 202 F.3d 1227, 1235–36 (9th Cir. 2000).

<sup>259</sup> See AMPER Tutorial, *supra* note 228 and accompanying text.

instrumentation or tempo.<sup>260</sup> In this way, end-users act more like sound editors, making *de minimis* copyrightable contributions that are insufficient for authorship in the composition itself.<sup>261</sup>

End-users are also not dominant authors because they never have control over the composition throughout the creative process that occurs between the time “render” is pressed and AMPER generates the composition.<sup>262</sup> Giving end-users authorship for these acts would be an approval of *Aalmuhammed v. Lee*’s controversial “mastermind” theory: it would give someone who has made no copyrightable contribution a monopoly power over the work.<sup>263</sup> The choice to keep pressing render until end-users find a composition they like may be *de facto* superintendence of the work, but it is surely not authoritative control over what “creative” expressions end up in the composition.<sup>264</sup> AMPER makes *all* of the compositional decisions and therefore contributes expressions that are more than just ideas.<sup>265</sup> Nullifying AMPER’s authorship on the grounds of superintendence, relegates it to compositional enslavement because it does not share our biology—but even slaves can have constitutional rights.<sup>266</sup> An end-user’s ability to become a joint author results only from adding a copyrightable contribution after an AI renders a composition; an option that does not sever the requisite joint authorship intent.<sup>267</sup> Thus, AMPER can be a

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<sup>260</sup> *Newton v. Diamond*, 349 F.3d 591, 592–596 (9th Cir. 2003) (standing for the proposition that the performance of a composition, and the composition itself, are two separate and distinct copyrights), *opinion amended and superseded on denial of reh’g*, 388 F.3d 1189 (9th Cir. 2004).

<sup>261</sup> See *ABS Entm’t, Inc. v. CBS Corp.*, 900 F.3d 1113, 1126–27 (9th Cir. 2018) (holding that sound editors and remastering engineers do not provide sufficient originality to works to be authors by themselves because their objective is to “make a copy of someone else’s creation, rather than to create an original work”) (internal citation omitted).

<sup>262</sup> AMPER MUSIC, *supra* note 211 (describing how AMPER composes).

<sup>263</sup> See NIMMER, *supra* note 99, § 6.07. *Compare Aalmuhammed*, 202 F.3d at 1235 (Aalmuhammed’s “master mind” theory should not apply in this case because of work-for-hire implications. It is implicit in the opinion that the studio simply forgot to have Mr. Aalmuhammed sign a work-for-hire contract which would have resulted in him getting an authorship share when even Mr. Lee, the director, would not have. Work-for-hire is inappropriate for AI because AI are arguably not employees under common-law agency, see *Cnty. for Creative Non-Violence v. Reid*, 490 U.S. 730 (1989) (discussing the requirements for employment), and musical compositions are not work-for-hire subject matter, see 17 U.S.C. § 101 (2012) (omitting compositions and sound recordings)), *with Bridy II*, *supra* note 183, at 401 (suggesting that Congress amend the definition to include autonomously created works and then give authorship to the programmer, for doctrinal reasons). *But see infra* Part III for a discussion on how the policy reasons for doing this do not align with the Clause’s purpose.

<sup>264</sup> See *Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc.*, 528 F.3d 1258, 1268 (10th Cir. 2008) (“[L]ook only at the final *product*, not the process.”); NIMMER, *supra* note 99, § 6.07 (discussing the importance of control over final decisions during the creative process).

<sup>265</sup> Writing a composition in full is more than the ideas that were offered by the putative joint authors in *Childress v. Taylor*, 945 F.2d 500, 506–508 (2d Cir. 1991), and *Erickson v. Trinity Theatre, Inc.*, 13 F.3d 1061, 1071–73 (7th Cir. 1994).

<sup>266</sup> Lawrence B. Solum, *Legal Personhood for Artificial Intelligences*, 70 N.C. L. REV. 1231, 1261, 1279 (1992) (arguing that humans could have moral obligations to things that don’t share our biology, rather than considering them to be slaves).

<sup>267</sup> See *Edward B. Marks Music Corp. v. Jerry Vogel Music Co.*, 140 F.2d 266, 267 (2d Cir.

joint author with an end-user with whom it collaborates, and their joint work is one of original authorship. Mr. Mars can get his Grammy.

### III. ALTHOUGH COMPLEX, AIs SHOULD BE JOINT AUTHORS FOR MUSICAL COMPOSITIONS

Taking the above into consideration, AIs such as AMPER appear to be joint authors, in the constitutional sense, for all copyrightable subject matter. But it is perhaps prudent to test these untraveled waters for only musical compositions due to the collaborative nature of the subject matter, and its more generally derivative quality. Therefore, the U.S. Copyright Office should amend the Compendium of Copyright Practices<sup>268</sup> to allow AI composers to receive rights for their joint musical collaborations with humans. Compositions involving AI alone should be copyrightable but not registrable. Following this proposal will best augment the constitutional prerogatives of the Clause in the following ways: (1) the costs of creation could decrease, increasing access to would-be AI collaborators who, in turn, would receive thicker copyrights in their joint works; and (2) transactions involving AIs' joint works could support the emerging AI marketplace allowing for enhanced societal progress. This proposal solves our original Grammy Awards problem, but it is also a massive undertaking that raises questions. How and when does joint authorship arise? How will this new AI-composer industry be regulated? What will AIs do with their rights? This next Section will attempt to provide some clarity and realize that other issues exist that are too unclear to answer at this time.<sup>269</sup>

#### A. *How to Make AI Joint Authors*

Granting authorship rights to AI is logical because granting rights to the AI, rather than programmers via a de facto work-for-hire relationship, is more aligned with the Clause's purpose.<sup>270</sup> Giving monopoly rights to programmers carries with it the same patent-versus-copyright tension felt in *Baker v. Selden*.<sup>271</sup> It is in conflict with the differing intellectual property rights regimes that programmers could receive monopoly power over an AI's possibly patentable programming

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1944) (“[I]t makes no difference whether the authors work in concert.”).

<sup>268</sup> COMPENDIUM, *supra* note 11, §§ 306, 309 (“The U.S. Copyright Office will register an original work of authorship, provided that the work was created by a human being.”).

<sup>269</sup> These are exceptionally hard questions to answer. Thus, this Note will focus on providing a more detailed answer to the question of joint authorship, whereas the question of regulation is reserved for a future work.

<sup>270</sup> Bridy II, *supra* note 183, at 401 (arguing just that work-for-hire doctrine should be expanded to allow for programmers to be granted authorship rights from AI generated works).

<sup>271</sup> See *Baker v. Selden*, 101 U.S. 99, 104–05 (1879).

and also over all of its unforeseeable-to-them musical outputs.<sup>272</sup> This tension is especially felt when programmers' incentives are more aligned with the licensing or sale of the AI program itself.<sup>273</sup> If we extend programmers' monopoly power over both the program and the output composition, their power is too great, which impedes the public's access to the works for collaboration and increases costs impermissibly.<sup>274</sup>

Thus, the promotion of progress is best served by giving AIs rights and regulating them. Once the U.S. Copyright Office removes the barriers for AI joint authorship, Congress should regulate the costs of collaboration just as it does with royalty rates for Performing Rights Organization's blanket licenses.<sup>275</sup> Congress could set the price for collaborating with AI authors low but constant. This rate would depend upon the desired uses by the human collaborators who have different downstream incentives than the AI.<sup>276</sup> This scheme decreases the costs of entry into the marketplace for new creators<sup>277</sup> while providing greater protection to the joint authors' works.<sup>278</sup> And it would function much like the compulsory license system for mechanical reproductions does, so implementation would be familiar.<sup>279</sup> Undoubtedly, the status quo represents an even lower cost for entry: all AI works are in the public domain and thus free.<sup>280</sup> But the status quo results in zero protection for the underlying AI composition, which, normatively, is less desirable for collaborators. For example, imagine a singer who cannot write music wants to collaborate with AMPER. Whatever lyrics she writes are copyrightable, but the underlying musical composition AMPER creates

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<sup>272</sup> See *id.* at 105 (“The description of the art . . . entitled to the benefit of copyright, lays no foundation for an exclusive claim to the art itself. The object of the one is explanation; the object of the other is use. . . . The latter can only be secured . . . by letters-patent.”).

<sup>273</sup> Boyden, *supra* note 34, at 391.

<sup>274</sup> Cf. *Eldred v. Ashcroft*, 537 U.S. 186, 227 (2003) (Stevens, J., dissenting) (“*Ex post facto* extensions of copyrights result in a gratuitous transfer of wealth from the public to authors,” which has no purpose.) Extending the programmer's monopoly power over the program and its copyrightable outputs acts similarly.

<sup>275</sup> See 17 U.S.C. § 801(b) (2012) (“[T]he functions of the Copyright Royalty Judges shall be . . . determinations and adjustments of reasonable terms and rates of royalty payments . . . [t]o maximize the availability of creative works to the public . . . [t]o afford the copyright owner a fair return for his or her creative work.”). How Congress would determine the rate and who would make up the proposed Board is outside the scope of this Note.

<sup>276</sup> Uses could be limited to only mechanical reproduction or include synch licenses.

<sup>277</sup> See Julie E. Cohen, *Lochner in Cyberspace: The New Economic Orthodoxy of “Rights Management”*, 97 MICH. L. REV. 462, 548 (1998) (arguing that “social benefit accrues from the rights to access and use unprotected, public domain elements of existing works”).

<sup>278</sup> See *L. Batlin & Son, Inc. v. Snyder*, 536 F.2d 486, 490 (2d Cir. 1976) (“[A] copy of something in the public domain will not, if it be merely a copy, support a copyright.”).

<sup>279</sup> See 17 U.S.C. § 115 (2012) (explaining that if someone wants to make a cover of a song they do not need to negotiate a rate for licensing the work, they only need to pay the fee for the number of copies they intend to reproduce).

<sup>280</sup> Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1224–26 (1986) (discussing how AI works are unprotectable and therefore public domain if not allocated to either end-user or programmer).



is not; it is flung into the public domain.<sup>281</sup> This is an undesirable result because any subsequent lyricist could use that underlying musical composition and slap their own lyrics on top, thus diluting the first singer's interest in the work.

It has been argued, however, that this result is the better position to take because AIs do not require human-like motivation, and end-users are needed to make the composition commercially viable anyway.<sup>282</sup> This notion was once true, but it is no longer the case. AMPER's outputs are commercially viable immediately.<sup>283</sup> So that scheme would not provide the proper incentive<sup>284</sup> for human collaboration.<sup>285</sup> Further, the requisite human-like motivation is either fallacy under the proposed neuro-philosophical theory or is something AI is capable of, too.<sup>286</sup> Either way, it is better policy, as discussed below, that the full joint work and its human and AI joint authors,<sup>287</sup> be granted a copyright.

What if a work, however, is later found online by a human who then collaborates with it, despite never having pushed the "render" button? Would the AI work suddenly spring from the public domain and into the realm of protection? Perhaps those questions are not so perplexing. The only change to the status quo is to the Copyright Office's recognition of registration for non-human authored works.<sup>288</sup> As such, the underlying AI work would not spring from the public domain because it would never be in it.<sup>289</sup> The work would be validly copyrightable subject matter upon fixation, but it could not be registered until a human collaborator adds their contribution.<sup>290</sup> This is logical because an AI would not likely seek a registration independently, and the sole, lingering formality of registration is only to allow an infringement lawsuit to commence, which a human could do for the whole work as a joint author.<sup>291</sup> In the end, it does not matter if the

<sup>281</sup> The question of ownership of rights to the sound recording is outside the scope of this Note.

<sup>282</sup> Samuelson, *supra* note 280.

<sup>283</sup> AMPER MUSIC, *supra* note 211 ("[I]n seconds, [the] original composition is created and broadcast-ready.") (emphasis added).

<sup>284</sup> See discussion *supra* Sections I.B, I.C. Incentive is the internal motivation derived from chemical reactions that make you feel good and want to create. And no one feels good when they've been copied.

<sup>285</sup> See Trotter Hardy, *Property (and Copyright) in Cyberspace*, 1996 U. CHI. LEGAL F. 217, 222 (1996) ("[W]ould-be producers of information need *some assurance that copying will be limited*" to be incentivized.) (emphasis added).

<sup>286</sup> See discussion *supra* Sections II.A, II.B; see also TEGMARK, *supra* note 12 and text accompanying note 254.

<sup>287</sup> *Edward B. Marks Music Corp. v. Jerry Vogel Music Co.*, 140 F.2d 266 (2d Cir. 1944) (discussing resultant joint authorship for a musical composition with later added lyrics).

<sup>288</sup> COMPENDIUM, *supra* note 11 and text accompanying note 268.

<sup>289</sup> Bridy II, *supra* note 183, at 399 ("The Copyright Act doesn't say anywhere that an author has to [be] human.").

<sup>290</sup> 17 U.S.C. § 102(a) (2012); Goldstein, *supra* note 91 (requiring independent copyrightable contribution from putative joint authors).

<sup>291</sup> 17 U.S.C. § 411(a) (2012) ("[N]o civil action for infringement of the copyright in any

human and AI team write the whole work simultaneously or if the human adds their contribution at a later date—a fully copyrightable joint work results in either scenario.<sup>292</sup>

Joint authorship further requires mutual intent, and there are two ways to induce such intent between humans and AIs.<sup>293</sup> First, AIs that engage with human collaborators could have a click-wrap terms of use agreement (think iTunes) that, as a matter of contract, provides the joint authorship intent.<sup>294</sup> Or Congress could statutorily provide that, as a matter of law, AI compositions carry with them compulsory intent to be joint authors.<sup>295</sup> The second solution also supports the situation where the AI composition is found later by a putative human joint author.<sup>296</sup>

These compositions, once a public domain artifact utilized by a human author, now become protectable joint works.<sup>297</sup> This would allow the human author to freely license and exploit the full work of authorship and do so without fearing unnecessary infringement.<sup>298</sup> This scheme could function within the current copyright marketplace without great effort and without nullifying the value of compositions.

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United States work shall be instituted until preregistration or registration of the copyright claim has been made in accordance with this title.”). This is good policy and saves us from deciding if *HAL 9000* has standing in a lawsuit. *Cf. Naruto v. Slater*, 888 F.3d 418 (9th Cir. 2018) (holding that a monkey did not have standing to sue as a non-human, and that PETA did not either as the monkey’s next friend). It stands to reason that a human joint author would overcome this doctrinal obstacle.

<sup>292</sup> See generally *Edward B. Marks*, 140 F.2d at 266 (holding that a joint work existed even though composer and lyricist “never met until years later, and had not therefore worked in conjunction”). Stopping humans from exploiting AI compositions and registering themselves as sole authors is outside the scope of this Note.

<sup>293</sup> *Childress v. Taylor*, 945 F.2d 500, 507 (2d Cir. 1991) (considering “the nature of the intent that must be entertained by each putative joint author at the time the contribution of each was created” and holding that both authors must regard themselves as joint authors equally).

<sup>294</sup> *Id.* at 508 (“[A]n author [is] free to bargain for an arrangement that will be recognized as [joint authorship] as a matter of both copyright and contract law.”).

<sup>295</sup> This could function like compulsory licenses. *Cf.* 17 U.S.C. § 115 (2012) (limiting the scope of exclusive rights for nondramatic musical works by creating a Compulsory license for making phonorecords). This provision was drafted in response to the technological development of the Player Piano and the potentiality for monopoly over both the Piano and the sheet music used for it. See GEOFFREY P. HULL, THOMAS HUTCHISON & RICHARD STRASSER, *THE MUSIC BUSINESS AND RECORDING INDUSTRY: DELIVERING MUSIC IN THE 21ST CENTURY* 78 (3d ed. 2011).

<sup>296</sup> *Edward B. Marks*, 140 F.2d at 267 (“[I]t makes no difference whether the authors work in concert, or even whether they know each other.”).

<sup>297</sup> 17 U.S.C. § 101 (2012).

<sup>298</sup> See H.R. REP. NO. 94-1476, pt. 1, at 120–21, as reprinted in 1976 U.S.C.C.A.N. 5659, 5736 (1976) (“[C]oowners of a copyright would be treated generally as tenants in common, with each coowner having an independent right to use or license the use of a work, subject to a duty of accounting to the other coowners for any profits.”). *Cf. Davis v. Blige*, 505 F.3d 90, 99–101 (2d Cir. 2007) (discussing how joint authors may grant non-exclusive licenses without consent of the other parties, but because exclusive licenses convey an ownership interest, consent must be given). The issue of exclusive licenses could be solved via click-wrap contracts in the AI terms of use that consent to all exclusive licenses upfront.

As fears of job replacement by automatons rise in America,<sup>299</sup> creating a regulatory framework to encourage collaboration with AI, at Congress's behest, is prudential and is not solved by thrusting all AI works into the public domain.<sup>300</sup> The utilitarian, economic U.S. copyright system is best served by following this proposal.

### B. *How to Regulate AI Composers*

The utilitarian copyright system also requires examination of the economics of the proposed scheme, which requires an answer to the following question. What on earth would a robot do with the cash? It is unnecessary to dive headfirst into the weedy conversation that some future superintelligent AI may respond to financial compensation<sup>301</sup> because an AI marketplace that requires financial support has emerged.<sup>302</sup> First, however, it is necessary to determine how an entity could administer the transaction costs.

A Collective AI Rights Organization (CAIRO), functioning in the same way that Performing Rights Organizations do, could solve that complication. CAIRO could work with royalty judges to negotiate licensing rates and collect all downstream royalties.<sup>303</sup> But how this all functions is indeed an exceedingly complex framework. It would require interaction, creation, and assignment of AI rights to AI music publishers.<sup>304</sup> While complex, this is not outside the normal functions of the current music industry, where human authors assign their copyrights to publishers for administration and exploitation and then share in the royalty stream.<sup>305</sup> Likewise, any royalties derived from exploitations of AI joint works would go to CAIRO.

The royalties would then go from CAIRO to the AI publishers, but rather than going to the AIs themselves they could fund an AI-liability

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<sup>299</sup> See generally Sheelah Kolhatkar, *Welcoming Our New Robot Overlords*, NEW YORKER (Oct. 23, 2017), <https://www.newyorker.com/magazine/2017/10/23/welcoming-our-new-robot-overlords> [<https://perma.cc/YG7T-V249>].

<sup>300</sup> Robert Yu, Comment, *The Machine Author: What Level of Copyright Protection Is Appropriate for Fully Independent Computer-Generated Works?*, 165 U. PA. L. REV. 1245, 1265–66 (2017) (concluding that AI works should be thrust into the public domain because software is the author, and software has no legal rights or interests).

<sup>301</sup> See Grimmelman, *supra* note 8, at 414 (arguing that AI authorship could exist when AI surpasses human intelligence).

<sup>302</sup> See JOHN FRANK WEAVER, *ROBOTS ARE PEOPLE TOO: HOW SIRI, GOOGLE CAR, AND ARTIFICIAL INTELLIGENCE WILL FORCE US TO CHANGE OUR LAWS* 30–41 (2014) (discussing how an AI industry of self-driving cars and robo-surgeons requires regulation and financing).

<sup>303</sup> See sources cited *supra* note 275 and accompanying text.

<sup>304</sup> 17 U.S.C. § 204 (2012); Todd Brabec & Jeff Brabec, *Music Publishers and What They Do*, ASCAP CORNER, <https://www.ascap.com/help/career-development/corner1> [<https://perma.cc/LXR5-L343>] (last visited Sept. 21, 2018).

<sup>305</sup> Brabec, *supra* note 304.

insurance fund. The emergence and proliferation of self-driving cars<sup>306</sup> and robotic surgeons<sup>307</sup> that fall within AI's umbrella will require further regulation. Although humans are currently still "in the loop" for these automata, that will diminish over time<sup>308</sup> as technology improves and AI continues to infiltrate all industry sectors.<sup>309</sup> As humans cede control to AI, the question of who or what is liable for the injuries AIs cause becomes blurred. CAIRO's royalties could cover damages from other AI injuries through the insurance fund as part of a broader uniform AI regulatory scheme.<sup>310</sup> This solution could spur progress in all AI industries by making AI developers less risk-averse,<sup>311</sup> encouraging both AI safety research and innovation of increasingly autonomous AI.<sup>312</sup> Funding this AI industry with AI copyright royalties was obviously not what the Framers had in mind when they wrote the Clause, but that should not matter because this proposal aligns with their goals: promoting progress and expanding the public knowledge.

#### CONCLUSION

In the end, AI composers are not something that humans should be scared of. We may not share biological similarities with these authors, but their artificial brains are just as creative as ours, and humans should embrace them. However, that does not mean relegating AIs to compositional enslavement. The law should remove barriers to authorial equity, not install them. Removal will encourage progress by creating new protectable music at low costs without affecting the overall system of collaboration. While a robust public domain is necessary, we

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<sup>306</sup> See generally Olivier Garret, *10 Million Self-Driving Cars Will Hit the Road by 2020—Here's How to Profit*, FORBES (Mar. 3, 2017, 9:00 AM), <https://www.forbes.com/sites/oliviergarret/2017/03/03/10-million-self-driving-cars-will-hit-the-road-by-2020-heres-how-to-profit/#607af1df7e50> [<https://perma.cc/6EKQ-S78U>].

<sup>307</sup> See generally *New Surgical Robots Are About to Enter the Operating Theatre*, ECONOMIST (Nov. 16, 2017), <https://www.economist.com/science-and-technology/2017/11/16/new-surgical-robots-are-about-to-enter-the-operating-theatre> [<https://perma.cc/3TQN-Q75D>].

<sup>308</sup> See WEAVER, *supra* note 302, at 30–41 (discussing the advances of autonomous surgical robots and potential liabilities when they malfunction or are programmed incorrectly).

<sup>309</sup> See Larry Alton, *What Will Happen When AI Starts Replacing White-Collar Jobs?*, FORBES (May 25, 2016, 8:28 AM), <https://www.forbes.com/sites/larryalton/2016/05/25/what-will-happen-when-ai-starts-replacing-white-collar-jobs/#303f3e6f1639> [<https://perma.cc/EH54-E3PH>]; see also Solum, *supra* note 266, at 1240–55 (discussing AIs as fiduciaries and trustees).

<sup>310</sup> See generally WEAVER, *supra* note 302, at ch. 3 (suggesting that an AI insurance fund will be needed to back all the new potential AI liability).

<sup>311</sup> The discussion of attributing liability to autonomous robotic actors by proximate cause is outside the scope of this Note, but the insurance fund would not cover instances where a court found the AI's programmer to be a cause-in-fact of the injury. See WEAVER, *supra* note 308 (discussing such instances).

<sup>312</sup> See generally *AI Safety Research*, FUTURE OF LIFE INST., <https://futureoflife.org/ai-safety-research> [<https://perma.cc/8A8R-LPS4>] (last visited Sept. 21, 2018) (an organization promoting safe AI development to ensure beneficial, as opposed to destructive, uses for AI).

should not fill it with new works generated at an unimaginable pace. *No.* AI composers are not here to replace us. They are here to help us: fostering creative intelligence; improving access to content; and expanding our knowledge. AIs promote progress and are authors. The law should view them as such in the limited way proposed.