

# SECOND-DEGREE INTELLECTUAL PROPERTY

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## I. INTRODUCTION

The emergence of institutional “intellectual property” can be traced back to the first Venetian patents in the sixteenth century and the Statute of Anne and related developments in the field of authors’ rights on the European continent in the late seventeenth and early eighteenth century.<sup>1</sup> Intellectual property (IP) is underpinned by various admixtures of natural law precepts,

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1. See Christopher May, *The Venetian Moment: New Technologies, Legal Innovation and the Institutional Origins of Intellectual Property*, 20 PROMETHEUS 159, 169 (2002). In this Article, the term “intellectual property” is used to refer essentially to copyright and patent law, although some of the Article’s analysis and suggested solutions could apply to other rights, including designs.

some of them anchored in authorial dignity, others in the Lockean desert approach, and, more recently, a law and economics analysis of market failures and the relationship between law and innovation.<sup>2</sup> Despite this evolution of theoretical frameworks, and ongoing disagreements about the role of non-economic factors, one *constant* throughout this history has been that the underlying creativity and ingenuity was human. Put simply, only humans could invent or create, and only humans developed the languages that allow us to communicate complex ideas to one another, whether spoken or pictorial. Until now.<sup>3</sup>

Artificial Intelligence (AI) machines can perform many tasks, from driving autonomous vehicles, to providing speech-based customer service, to folding proteins.<sup>4</sup> But perhaps the most dramatic aspect of AI to date has been the emergence of Large Language Models (LLMs) and the related development of Generative AI (GenAI). From an IP perspective, GenAI changes, well, just about everything. GenAI is already making it cheaper and faster to produce literary and artistic content such as new music or newspaper articles, and new inventions, such as new molecules to treat various diseases.<sup>5</sup> And this is just the beginning.

Given the changes wrought by GenAI, it is no exaggeration to say that GenAI raises serious questions about the future of humanity. Think about it. The evolution of ideas may no longer be driven by humans; art and literature produced by humans may no longer have access to viable markets due to competition from “cheap” content.<sup>6</sup> Although humans and machines “think” differently, machines can outperform humans at many tasks requiring high

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2. See generally William Fisher, *Theories of Intellectual Property*, BERKMAN KLEIN CTR. FOR INTERNET & SOC'Y AT HARV. U., <https://cyber.harvard.edu/people/tfisher/iptheory.pdf>.

3. See Kevin Ellis, Adam Albright, Armando Solar-Lezama, Joshua B. Tenenbaum & Timothy J. O'Donnell, *Synthesizing Theories of Human Language with Bayesian Program Induction*, NATURE COMM'NS 13, 5024 (2022) (suggesting that by using natural language, AI machines have “routes for machines that learn the causal structure of the world, while representing their knowledge in a format that can be reused and communicated to other agents, both natural and artificial.”).

4. On self-driving (autonomous) vehicles, see Ed Garsten, *What Are Self-Driving Cars? The Technology Explained*, FORBES (Jan. 23, 2024), <https://www.forbes.com/sites/technology/article/self-driving-cars/?sh=41f9f1e05e07>. On customer service, see Bernard Marr, *How Generative AI Is Revolutionizing Customer Service*, FORBES (Jan. 26, 2024), <https://www.forbes.com/sites/bernardmarr/2024/01/26/how-generative-ai-is-revolutionizing-customer-service/?sh=76ebdbd66944>. On protein folding, see Robert F. Service, *The Game Has Changed: AI Triumphs at Protein Folding*, 370 SCIENCE 1144 (2020).

5. See DANIEL J. GERVAIS, *The Human Cause*, RESEARCH HANDBOOK ON INTELLECTUAL PROPERTY AND ARTIFICIAL INTELLIGENCE 21, 23–24 (Ryan Abbott, ed., 2022) (providing examples of facially copyrightable or patentable outputs by AI machines).

6. See Dan L. Burk, *Cheap Creativity and What It Will Do*, 57 GA. L. REV. 1669 (2023).

cognition. The human monopoly on making and enforcing law, including—significantly—the “right” that humans have arrogated to themselves to decide what is “legal” to do to other species and to the planetary ecosystem as a whole, is in serious jeopardy with the arrival of autonomous entities that can outperform us and are likely not overly concerned about being obligated to pay damages, fines, or imprisonment—two of the most common tools of law enforcement.

In this Essay, I take a narrower focus. Until the advent of AI, particularly LLMs, there was, as noted above, at least one human creators or inventors who caused the creation or invention to occur. This human involvement gave originality to a copyrighted work or inventiveness to an invention, which made it non-obvious to a person skilled in the art.<sup>7</sup> Put simply, there has always been only one degree of separation between the creation or invention on the one hand and one or more persons on the other. Thus, IP has always been *first-degree*.

I then ask the following question: what happens when the kind of material currently protected by copyright and patent law is created not by humans, but by machines built, programmed, and trained by humans. Thus, for the first time in history, we must ask whether *second-degree IP* rights should exist, which requires both a doctrinal analysis of current factors and, recognizing that such factors predate the radical changes just described, a normative analysis of whether it is justified to grant such rights.

The use of the term “degree” in this context was prompted by Professor Pam Samuelson’s observation, made many years ago, that granting a programmer rights to the output of the machine would “over-reward . . . the programmer, particularly in light of the fact that the programmer is no more able to anticipate the output than anyone else.”<sup>8</sup> This prescient comment contains both the idea that the programmer is *too far removed* from the output (hence, second degree) to qualify for protection and that the machine is “autonomous” to a significant degree in producing the output. Copyright is meant as an incentive for *humans*.<sup>9</sup> Here as on many other occasions, Professor Samuelson’s work on copyright promoting progress is particularly helpful, as

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7. The notion of cause was usefully applied in this context by Professor Shyamkrishna Balganesh. See Shyamkrishna Balganesh, *Causing Copyright*, 117 COLUM. L. REV. 1 (2017) (developing a theory of authorial causation connecting human agency to the expression embodied in a copyrighted work).

8. See Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1208 (1985).

9. See *id.* at 1224 (“If there is no human author of such a work, how can any human be motivated to create it? The copyright system assumes that society awards a set of exclusive rights to authors for limited times in order to *motivate* them to be creative . . .”).

she has rightly directed readers to consider the changing nature of technology as a necessary vector of a proposal to adapt the copyright framework over time.<sup>10</sup> She also put her finger on the reason why GenAI is “more disruptive than previous technologies,” namely “the exceptionally rapid pace at which generative AI technologies have been launched, adopted, and adapted,” but also its “substantial impacts on the careers of professional writers and artists.”<sup>11</sup>

Machines can now program themselves, so that, like cousinhood, machine-generated content may ultimately be even more distant from humans.<sup>12</sup> For example, a machine (possibly with the ability to modify its own code) could be programmed to program medical research machines that would then produce new molecules, identify targets of interest, and perform *in silico* research, a combination that might be enough to claim a patent under current law.<sup>13</sup> I deliberately use medical research as an example because GenAI will most certainly produce valuable content.<sup>14</sup> As with *de novo* molecular design and optimization, there will be thousands of songs and novellas produced by AI.<sup>15</sup>

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10. See Michael W. Carroll, *Committed to Copyright's Constitutional Role*, 39 BERKELEY TECH. L.J. 1199 (2024) (discussing Professor Samuelson's scholarship on the application of copyright to software).

11. Pamela Samuelson, *Generative AI Meets Copyright*, 381 SCIENCE 158, 159 (2023).

12. See Cade Metz, *A.I. Can Now Write Its Own Computer Code. That's Good News for Humans.*, N.Y. TIMES (Sept. 9, 2021), <https://www.nytimes.com/2021/09/09/technology/codex-artificial-intelligence-coding.html>.

13. Clinical trials (on human patients) are not required to obtain a patent on a new molecule. Nor is FDA a prerequisite for finding a compound useful within the meaning of the patent laws. See *Scott v. Finney*, 34 F.3d 1058, 1063 (Fed. Cir. 1994) (noting that FDA approval is not required to patent a new molecule). If one wanted to push the scenario a bit further, the machine could also announce the clinical trials, select human candidates, manage communications (voice/email) with candidates, and then process and publish the data.

14. See Rizwan Qureshi, Muhammad Irfan, Taimoor Muzaffar Gondal, Sheheryar Khan, Jia Wu, Muhammad Usman Hadi, John Heymach, Xiuning Le, Hong Yan & Tanvir Alam, *AI in Drug Discovery and Its Clinical Relevance*, 9 HELIYON 1, 17 (July 2023), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10302550/pdf/main.pdf> (“AI-based methods are being adopted in the health care industry where low-cost, intelligent, and flexible methods are affecting areas such as drug design, support for clinical decision making, diagnosis, prevention, and making clinical recommendations. . . . AI has been implemented by some pharmaceutical organizations, with revenue from AI-based solutions in the pharmaceutical sector estimated to reach US \$2.199 billion by 2022.”).

15. On new molecules, see *id.* at 16. On novellas, see Adi Robertson, *I Tried the AI Novel-Writing Tool Everyone Hates, and It's Better than I Expected*, VERGE (May 24, 2023), <https://www.theverge.com/2023/5/24/23732252/sudowrite-story-engine-ai-generated-cyberpunk-novella>. On music, see Andrew R. Chow, *AI's Influence on Music Is Raising Some Difficult Questions*, TIME (Dec. 4, 2023), <https://time.com/6340294/ai-transform-music-2023/> (describing AI tools such as BandLab, Endel and Google DeepMind's Lyria model that produce music).

Some are likely to find a place in the marketplace. In many cases, machine-generated content may bring significant benefits to the public. At the same time, it may crowd out existing copyrighted works or patented inventions, limiting the space available for human creations and inventions in the same marketplace. This dual lens is, I suggest, the proper analytical path, because it takes into account both the costs and benefits of the outcomes for humans as users and producers of creations and inventions. The societal impacts that should inform policy decisions in this area require a comprehensive approach, one that is not myopically focused only on possible commercially viable/valuable outputs.

This approach is rooted in the belief that IP was and is intended to promote progress. There is little doubt (at least in my mind) that the word “progress” in Article I, Section 8, Clause 8 meant *human* progress to the Founding Fathers.<sup>16</sup> A simple thought experiment should suffice to prove the point: if all humans died, would the U.S. Constitution’s direction still be followed if AI machines issued patents or copyright registration certificates for art and science produced by machines, and for machines?<sup>17</sup> If the reader agrees with me that the answer is negative, then the real—or at least more immediate—question to ask is whether delegating to machines the task of producing inventions and facially copyrightable material helps or hinders human progress, because IP was created to provide incentives *for humans*. As Professor Samuelson noted in that regard, “[i]f there is no human author of such a work, how can any human be motivated to create it? The copyright system assumes that society awards a set of exclusive rights to authors for limited times in order to *motivate* them to be creative.”<sup>18</sup> The answer, as the Essay below explains, is both. This leads me to conclude that the role of intellectual property law—and of law more generally—is to enhance the positive effects of GenAI and to mitigate the negative effects.

On the positive side, as noted above, medical and technological research may grow much faster in certain areas.<sup>19</sup> Machines can process vast amounts

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16. Madison referred to the role of intellectual property as producing “community benefits.” JAMES MADISON, *Monopolies. Perpetuities. Corporations. Ecclesiastical Endowments.*, in JAMES MADISON: WRITINGS 756, 767–68 (Jack N. Rakove ed., 1999); see also *Eldred v. Ashcroft*, 537 U.S. 186, 247 (2003) (Breyer, J., dissenting) (“[U]nder the Constitution, copyright was designed ‘primarily for the benefit of the public,’ for ‘the benefit of the great body of people, in that it will stimulate writing and invention.’” (quoting H.R. REP. NO. 60-2222, at 7 (1909))).

17. This is, of course, because the Constitution (like all other law) is human law, made by and for humans. See Daniel J. Gervais, *Towards an Effective Transnational Regulation of AI*, 38 AI & SOC’Y 391 (2023) (explaining that laws are not meant for all agents, only for humans).

18. Samuelson, *supra* note 8, at 1224.

19. See Qureshi et al., *supra* note 14.

of data, such as published patents and patent applications, scientific and medical journals and other information, in any language, find new correlations, for example by identifying potential new molecules to target specific diseases, and predicting their efficacy and toxicity, a process sometimes referred to as *in silico* (as opposed to *in vitro* or *in vivo*) research.<sup>20</sup> On the negative or high-risk-side of the equation, lest we forget, art and science are essential tools for interpreting our world. There will be a lot of non-human noise crowding the traditional channels that humans use to communicate and exchange ideas, including news, novels, movies, art, and music.<sup>21</sup>

As this Essay argues, the decline in the signal-to-noise ratio has two major consequences. First, the mimetic and epistemological signals that current generations send to the next become weaker; second, the intellectual tools we have to understand our world become both coarser and poorer. Yet it is with these tools, and through interpretation, that humans can become agents in the world and ultimately change it. Delegating this very purpose to machines is therefore pregnant with implications for the future, for it changes its arc.<sup>22</sup> One might counter that there will always be humans to write, pick up a paintbrush, or try to make a new invention, and that may be true, but market forces will inexorably push for the replacement of humans by machines whenever it is commercially desirable.

If machines can do both basic science and new technology development better, cheaper, and faster than humans, private labs may hire fewer human PhDs and postdocs. But the push will be almost inevitable, precisely because three powerful forces of capitalism will push human creators and inventors out of the picture: quality, price, and speed. Humans that remain will play a new role: collaborating with the machine, as prompt engineers, for example.<sup>23</sup>

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20. See Qureshi et al., *supra* note 14; Rachel L. Schwein, *Patentability and Inventorship of AI-Generated Inventions*, 60 WASHBURN L.J. 561, 569 (2021) (identifying several “inventions” made by AI machines).

21. See Carys J. Craig & Ian R. Kerr, *The Death of the AI Author*, 52 OTTAWA L. REV. 31, 86 (2021):

To say authorship is human, that it is fundamentally connected with *humanness*, is not to invoke the romantic author, nor is it to impose a kind of chauvinism that privileges human-produced artifacts over those that are machine-made. Rather, it is to say that human communication is the very point of authorship as a social practice—indeed, as a condition of life. As such, we do not think we are being at all romantic when we say that authorship, in this sense, is properly the preserve of the human.

22. See *id.*

23. See Li Wang, Xi Chen, XiangWen Deng, Hao Wen, MingKe You, WeiZhi Liu, Qi Li & Jian Li, *Prompt Engineering in Consistency and Reliability with the Evidence-Based Guideline for LLMs*, 7 NPJ DIGIT. MED. 41 (2024), <https://www.nature.com/articles/s41746-024-01029-4> (“[T]he application of LLMs in medicine is currently thriving. However, most of the current research seems to focus more on the results of using LLMs rather than how to better use LLMs in

University science departments may wither, as will the demand for human-made science, just as the market for human-created art in various forms may shrink. Why should Spotify pay for “human” music when it can use GenAI to generate thousands of songs on the fly, discarding those songs that users skip while keeping others?<sup>24</sup> We know the answer, because it is already happening.<sup>25</sup> The quest for a deeper and better understanding of the natural world, which has arguably animated humans since the invention of fire, will also be distorted. In sum, our highest and noblest ideals will be delegated, at least in part, to nonhumans. Despite the obvious benefits on the user side of the equation, this should give us pause.

The Article proceeds as follows. In the following Part, it provides an overview of current technology and forms of second-degree IP. Part III discusses how current copyright and patent law applies to second-degree IP. The final Part proposes a test for deciding whether second-degree IP rights should be granted at all, and if so, under what conditions, using the comprehensive societal impact approach outlined above.

## II. IDENTIFYING SECOND-DEGREE INTELLECTUAL PROPERTY

GenAI models such as ChatGPT, Dall-E, and others can produce literary and artistic content that looks like material protectable by copyright.<sup>26</sup> GenAI and other forms of AI are now routinely used in medical research, industrial design, and other fields, producing what appear to be patentable inventions and designs.<sup>27</sup> The key phrase in here, of course, is “looks like,” a matter to which the Essay will return in Part III. In this brief Part, the Essay will only attempt to place definitional limits on the notion of second-degree IP.

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clinical medicine. Testing the reliability of LLMs in answering medical questions, using different prompts, and even developing prompts specifically for medical questions could change the application of LLMs in medicine and future research.”).

24. And indeed, it is happening as expected. *See* ChrissyGee, *Release Radar This Week Was Almost All AI Generated Music*, SPOTIFY CMTY. BLOG (Sept. 1, 2023, 11:07AM), <https://community.spotify.com/t5/Content-Questions/Release-Radar-this-week-was-almost-all-AI-generated-music/td-p/5630466>.

25. *See id.*

26. Copyright subsists in “original works of authorship.” *See* 17 U.S.C. §§ 101, 102(a). Works typically belong to one of the listed categories: literary works; musical works; dramatic works, including any accompanying music; pantomimes and choreographic works; pictorial, graphic, and sculptural works; motion pictures and other audiovisual works; sound recordings; and architectural works.

27. *See* Gervais, *supra* note 5.

As noted in the Introduction, up to this point in human history, no other species or entity has been able to create copyrightable material or patentable inventions. Of course, there is an avowed speciesism at work here: human policymakers made IP laws to reflect work they thought was worth protecting.<sup>28</sup> Non-human animals produce things that are valuable, some directly as commercial products (e.g., chickens produce eggs), and others in ways that can inform human intellectual creativity and ingenuity (spiders weave webs). Yet these animals cannot obtain IP rights, both because they have no legal standing to do so, and because applying for IP protection requires the use of human language.<sup>29</sup> Like macaques, AI machines have no legal standing; but unlike macaques, they have mastered our language.<sup>30</sup>

As the technology currently stands, GenAI machines are programmed and trained by humans, and the computers they run on are also designed and built by humans, although the role of machines in designing, building, and programming new AI systems is expected to grow rapidly.<sup>31</sup> This means that there is a lot of first-degree IP in AI: the human-written code that powers GenAI systems is copyrighted.<sup>32</sup> Some human-invented AI systems are also potentially patentable. These are all “typical” forms of first-degree IP because they have a human proximate cause.

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28. Speciesism is the idea of assigning different values or rights to beings on the basis of their species membership. If someone were to argue that intellectual property is speciesist, they might suggest that IP laws prioritize human creativity and interests over those of other “species,” or that they fail to recognize the intellectual contributions of non-humans. It typically reflects the “the assumption of human superiority.” *Speciesism*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/speciesism>; see also Craig et al., *supra* note 21.

29. On the question of standing see *Naruto v. Slater*, 888 F.3d 418 (9th Cir. 2018) (refusing to recognize standing in a copyright claim for an Indonesian macaque who had picked up a camera left unattended and took some selfies).

30. See George Musser, *Building Intelligent Machines Helps Us Learn How Our Brain Works*, SCI. AM. (Mar. 19, 2024), <https://www.scientificamerican.com/article/what-the-quest-to-build-a-truly-intelligent-machine-is-teaching-us/> (“Large language models have acquired more problem-solving ability than most researchers expected they ever would. . . . [T]hese systems have unequivocally solved . . . language. They possess what experts call formal competence: they can parse any sentence you give them, even if it’s fragmented or slangy, and respond in what might be termed Wikipedia Standard English.”).

31. See Rina Diane Caballar, *How Coders Can Survive—and Thrive—in a ChatGPT World*, IEEE SPECTRUM (July 3, 2023), <https://spectrum.ieee.org/ai-programming>.

32. See RESTATEMENT OF THE L., COPYRIGHT § 2 cmt. a (AM. L. INST., Tentative Draft No. 2 Rev., 2022) (“The Copyright Act does not explicitly define computer programs as a species of literary works, but the Act’s legislative history does so, and courts and the Copyright Office have treated computer programs accordingly . . .”).



## A. HUMANS AS PROXIMATE CAUSE

The concept of causation is well known in law. In tort law, causation can have two meanings: causation-in-fact (also known as “simple cause”) and proximate causation (or “legal cause”). Causation-in-fact is the “but for” test, and is often the simplest: would the result have occurred but for the conduct of a person (usually the defendant in a tort case)?<sup>33</sup> If a person’s actions played a part—any part—in the outcome, then the answer is generally yes.<sup>34</sup> Proximate cause is a causal link between the conduct and the result but “unbroken by an efficient intervening cause.”<sup>35</sup> This can be interpreted to mean that causes that are two or more steps removed may not be proximate.<sup>36</sup>

In the case of AI systems, multiple people are typically involved in the creation and operation of AI machines, and many of them may thus make a “but for” contribution to an action or decision. But the main IP novelty contributed by GenAI is its ability to autonomously produce facially copyrightable or patentable material, in the sense that the human contributions to the programming and training of the AI (and, *a fortiori*, to the design and manufacture of the computer itself) are not proximate causes of the output; they are merely “but for” causes.

Applying this to IP law, we can safely say that “but for” causation is not sufficient to qualify for IP protection. Too many hands (and chips) may have played a role that is only tangentially related to the outcome (e.g., the company that provides the electricity) and yet be enough to pass a strict “but for” test.<sup>37</sup> The Essay therefore argues that some form of IP proximate causation, imbued with the requisite normativity, should be applied in place of simple cause. Put differently, the argument is that simple cause is both doctrinally and normatively insufficient; it is necessary to identify the source of the creative decisions (copyright) or the contribution to the actual conception of the invention (patent). The concept of “proximate” cause provides both a vocabulary and analytical paths that are useful in this context. Naturally, this

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33. Courts sometimes struggle to distinguish causation in fact and proximate cause. See Jane Stapleton, *Legal Cause: Cause-in-Fact and the Scope of Liability for Consequences*, 54 VAND. L. REV. 941, 945 (2001).

34. The term “causation in fact” is somewhat of a misnomer. Cause is not, strictly speaking, a “fact”; it is a relationship between two events. See Wex S. Malone, *Ruminations on Cause-in-Fact*, 9 STAN. L. REV. 60, 61 (1956).

35. *Beale v. Jones*, 171 S.E.2d 851, 853 (Va. 1970).

36. *Apple Inc. v. Pepper*, 587 U.S. 273, 279 (2019).

37. To take a simple example, the power company doesn’t get IP rights because it provided electricity to the lab, even though the invention would not exist but for the power generation. In the same vein, every programmer who worked on an AI machine arguably meets the “but for” threshold as a technical matter.

means an inversion of the notion's traditional role, as proximate or legal cause is more typically used to impose liability in appropriate cases rather than in a jurisgenerative role (in this case, generating IP protection).<sup>38</sup>

Where the notion of IP proximate cause may be particularly useful is in its *objective*, for it considers whether the conduct is “a *substantial factor* in bringing about” the result.<sup>39</sup> Proximate cause is a determination with built-in flexibility and steeped in temporal and other contextual constraints such as normalcy. It has great dynamicity, therefore. As U.S. Supreme Court Chief Justice Roberts noted in his dissent in *CSX*, the notion of proximate cause provides the vocabulary for answering questions such as “whether there was a superseding or intervening cause.”<sup>40</sup> Tort law recognizes that “external influences” may be considered as “superseding causes.”<sup>41</sup> From a normative perspective, “superseding” may be interpreted to mean *more relevant*. The Essay argues that courts *can and should* use this sieve in IP cases involving AI machines.<sup>42</sup> The difficulty in resolving close cases will be to identify a break in the legal causal chain between humans and the result (what looks like a copyrightable work or patentable invention). This break will be due to an *intervening cause*, namely the autonomous contribution of the AI machine.

In their (normative) application of proximity to the cause of a contribution to a literary or artistic work or an invention, there are two mistakes that courts might make. The first error would be to (over)reward (or hold accountable, for example, if the work produced infringes someone else's copyright) humans who are so far removed from the AI machine's operation as to be “far out,” to use the language of the U.S. Supreme Court.<sup>43</sup> In extreme cases, for example, the only meaningful human control over the machine may be a “kill switch.”<sup>44</sup> The second, related, potential mistake is to assume that someone must be rewarded or held accountable. It is possible that no human can be causally

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38. See RESTATEMENT (SECOND) OF TORTS § 9 (AM. L. INST. 1965).

39. *Id.*, cmt. a (emphasis added).

40. For example, “[t]he words ‘legal cause’ are used [...] to denote fact that the causal sequence by which the actor's tortious conduct has resulted in an invasion of some legally protected interest of another is such that the law holds the actor responsible for such harm unless there is some defense to liability.” Restatement (Second) of Torts: § 9 (Am. L. Inst. 1965); *CSX Transp., Inc. v. McBride*, 564 U.S. 685, 719 (2011).

41. See Weston Kowert, *The Foreseeability of Human-Artificial Intelligence Interactions*, 96 TEX. L. REV. 181, 184 (2017); Matthew U. Scherer, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*, 29 HARV. J.L. & TECH. 353, 365–66 (2016).

42. More rarely so in intentional tort cases. See Restatement (Third) of Torts § 33 cmt. e (Am. L. Inst. 2010).

43. *CSX Transp.*, 564 U.S. at 704.

44. See Thomas Arnold & Matthias Scheutz, *The “Big Red Button” Is Too Late: An Alternative Model for the Ethical Evaluation of AI Systems*, 20 ETHICS & INFO. TECH., 59, 60 (2018).

(factually and legally) linked to the result, and that no one should have an IP right in the machine's output. There are conditions that must be met in order to qualify for IP protection, and there is no rule that says that anything of value should benefit from an IP right, although the old trope "if value, then right" still has some normative purchase.<sup>45</sup> It should not. It is a return to the discredited notion of the "sweat of the brow" according to which mere expense and labor generated copyright protection.<sup>46</sup> Protecting autonomous machine creation without human creativity would amount to a 'sweat of the chip' approach, which this Article argues, should be firmly rejected. Copyright, as the Supreme Court explained in an earlier case, is intended to protect "the fruits of *intellectual* labor," not, therefore, computer processing.<sup>47</sup>

There are two well-established IP doctrines that can serve as vehicles for operationalizing proximate causation in IP law. In copyright law, courts should use originality because the U.S. Copyright Act grants protection only to original works of authorship. This notion of originality is, in fact, a worldwide standard, even though it is not explicitly spelled out in international treaties.<sup>48</sup>

The Supreme Court has ruled that originality is required by the Constitution, which allows Congress to protect the "Writings" of "Authors."<sup>49</sup> It found that it was "unmistakably clear" that the terms "Authors" and "Writings" in the Constitution presuppose a degree of originality.<sup>50</sup> Originality, in turn, requires a minimal degree of "creativity," a "creative spark."<sup>51</sup> Applied to AI, courts should define originality as requiring that a *human* spark be causally related to the output. This is the approach taken by the European Parliament in considering that "works autonomously produced by artificial

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45. An obvious example of something "of value" to human progress that would not be protected by an exclusive right is a scientific discovery or a formula such as  $E=mc^2$ . On "if value, then right," see Alfred C. Yen, *Brief Thoughts About If Value/Then Right*, 99 B.U. L. REV. 2479 (2019).

46. As the Supreme Court explained, "the 'sweat of the brow' doctrine flouted basic copyright principles. . . . Protection for the fruits of such research . . . may in certain circumstances be available under a theory of unfair competition. But to accord copyright protection on this basis alone distorts basic copyright principles in that it creates a monopoly in public domain materials without the necessary justification of protecting and encouraging the creation of 'writings' by 'authors.'" *Feist Publications, Inc. v. Rural Tel. Serv. Co., Inc.*, 499 U.S. 340, 354 (1991) (quoting *Nimmer* § 3.04, p. 3–23).

47. *In re Trade-Mark Cases*, 100 U.S. 82, 94 (1879).

48. See Daniel J. Gervais and Elizabeth F. Judge, *Of Silos and Constellations: Comparing Notions of Originality in Copyright Law*, 27 CARDOZO ARTS & ENT. L. J. 375 (2009); Daniel J. Gervais, *Feist Goes Global: A Comparative Analysis of the Notion of Originality in Copyright Law*, 49 J. COPYRIGHT. SOC'Y OF THE U.S.A. 949 (2002).

49. U.S. CONST. art. I, § 8, cl. 8.

50. *Feist*, 499 U.S. at 346.

51. *Id.*

agents and robots might not be eligible for copyright protection, in order to observe the principle of originality, which is linked to a natural person, and since the concept of ‘intellectual creation’ addresses the author’s personality.”<sup>52</sup>

In patent law, courts could use the concept of inventorship in a similar way, redefining it to achieve the goal of separating human from machine by focusing on the human contributions, if any, to the conception of the invention. As the Federal Circuit noted,

[T]he Supreme Court has held that, when used in statutes, the word “individual” refers to human beings unless there is “some indication Congress intended” a different reading. Nothing in the Patent Act indicates Congress intended to deviate from the default meaning. To the contrary, the rest of the Patent Act supports the conclusion that “individual” in the Act refers to human beings.<sup>53</sup>

In particular, human inventiveness should be directly causally related to the non-obviousness of the invention.<sup>54</sup> Interestingly, because much may be “obvious” to a machine, the use of AI tools may raise the bar for nonobviousness.<sup>55</sup> Put differently, “once AI is common in a given industry, inventors will have to meet the heightened burden of showing nonobviousness based on what a PHOSITA aided by AI—as well as any other widely available technology—would find reasonably pertinent to the problem solved by the invention.”<sup>56</sup> This parallelism between inventorship and nonobviousness has

52. European Parliament Resolution 2020/2015(INI) of 20 Oct. 2020, Intellectual Property Rights for the Development of Artificial Intelligence Technologies, ¶ 15, [https://www.europarl.europa.eu/doceo/document/TA-9-2020-0277\\_EN.html](https://www.europarl.europa.eu/doceo/document/TA-9-2020-0277_EN.html).

53. *Thaler v. Vidal*, 43 F.4th 1207, 1211 (Fed. Cir. 2022), cert. denied, 143 S. Ct. 1783 (2023) (citation omitted); *see also Ethicon, Inc. v. U.S. Surgical Corp.*, 135 F.3d 1456, 1460 (Fed. Cir. 1998).

54. *See Sarah R. Wasserman Rajec, Patent Term Tailoring*, 99 IND. L.J. 475, 477 (2024) (stating that patent grants are limited to human-made inventions that are new, useful, and nonobvious); *see also Erica Fraser, Computers as Inventors – Legal and Policy Implications of Artificial Intelligence on Patent Law*, 13 SCRIPTED 305, 306–07 (2016), <https://script-ed.org/article/computers-as-inventors-legal-and-policy-implications-of-artificial-intelligence-on-patent-law/> (“[A] computer could autonomously generate outputs that would be patentable inventions *if otherwise created by a human.*”) (emphasis added).

55. *See Connor Romm, Putting the Person in PHOSITA: The Human’s Obvious Role in the Artificial Intelligence Era*, 62 B.C. L. REV. 1413, 1439 (2021) (“Commentators worry that the current obviousness doctrine fails to understand how AI technology influences the modern inventive process. If true, this perceived blind spot in the doctrine would fail to equip the PHOSITA with the AI machines used by average workers in the field.”).

56. *Id.* at 1445; *see also Kenny Truong, Expanding Nonobviousness to Account for AI-Based Tools*, 104 J. PAT. & TRADEMARK OFF. SOC’Y. 51, 54 (2024) (“[O]bviousness should be determined based on whether a PHOSITA, using AI that is commonly employed in the inventive process in the pertinent field . . .”).

been used to argue that, if one views the PHOSITA and the inventor as “two sides of a coin,” then machine inventions should be patentable.<sup>57</sup> This is doctrinally defensible, but I would suggest that a broader analytical lens is needed to answer a question as ominous for human progress as whether AI inventions with no human proximate cause should be granted rights to exclude all others from making, using, and selling those inventions. There may be a more immediate threat to research and development, especially in business, if a massive number of incremental “AI patents” begin to be issued.

## B. PARSING SECOND-DEGREE INTELLECTUAL PROPERTY

In analyzing what is and is not second-degree IP, the previous Section suggests the complexity of the IP issues at stake: if there were intellectual property in GenAI outputs without a human proximate cause, who would own those rights?<sup>58</sup> The Article will return to this question in the next Part, but for now, let us consider the role of the person who often seems to take center stage: the prompt “engineer.”<sup>59</sup> GenAI machines work on the basis of prompts. A prompt is essentially a command to ask an AI to do something.<sup>60</sup> As the booming business of prompt engineering courses shows, prompts matter.<sup>61</sup> For example, a prompt could ask the GenAI machine to assume a certain role (e.g., “write in the style of a business consultant”); create a text on a certain topic (poem, song lyrics, travel recommendation, technical explanation, etc.); modify or edit existing objects such as text, computer code,

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57. See Mimi S. Afshar, *Artificial Intelligence and Inventorship - Does the Patent Inventor Have to Be Human?*, 13 HASTINGS SCI. & TECH. L.J. 55, 66 (2022).

58. We have been asking, but not answering, this question for decades. See Arthur R. Miller, *Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?*, 106 HARV. L. REV. 977, 1057–58 (1993) (“Suggested solutions include apportionment between the user (problem-specifier) and the owner of the artificial intelligence software copyright; apportionment between the person who created the program and the person who compiled the data; the author of the underlying computer program; the user of the program; the computer itself; the person who made the capital investment in the computer and its program; or a fictional, non-existent human author, with ownership of the copyright being apportioned among various claimants.”).

59. See Mark A. Lemley, *How Generative AI Turns Copyright Upside Down*, 25 COLUM. SCI. & TECH. L. REV. 190, 194 (2024) (“[We] ignore[] the creativity contributed by the AI but continue[] to reward creativity contributed by users, assuming the prompt or series of prompts is detailed enough to rise to the level of creative choice.”).

60. See Lydia Husser, *Prompt Engineering for Generative AI*, WEVOLVER (Apr. 25, 2023) <https://www.wevolver.com/article/prompt-engineering-for-generative-ai>.

61. Nik Popli, *The AI Job That Pays Up to \$335K—and You Don’t Need a Computer Engineering Background*, TIME (Apr. 14, 2023), <https://time.com/6272103/ai-prompt-engineer-job/> [<https://perma.cc/3WJL-HR6J>] (describing the booming business of prompt engineering).

or musical composition; provide examples; find data, and the list goes on.<sup>62</sup> But is the prompt engineer truly the “right holder” in the machine’s output? Or is it the company that programmed and trained the model?<sup>63</sup> Or neither?

At the end of this Part, the real question remains whether machine outputs should be protected when there is no human proximate cause, recognizing that in certain cases, prompt engineering by humans may be sufficient to create first-degree IP rights because there is still a human proximate cause. This could happen if human users of GenAI can produce a series of successive prompts to bring the output closer to their desired result. But these will be rare cases indeed. As Mark Lemley has argued, prompts are generally ideas, and their expression is that of the machine. Further, copyright protects expression, not ideas.<sup>64</sup> In patent law, an ingenious prompt identifies a novel problem; the patent belongs to the person who identifies the solution, though sometimes problem identification is a higher bar.

Finally, in defining second-degree IP, the possibility that the human-generated prompt(s) contains what is required to obtain copyright protection (in this case, as we will see in the next Part, this essentially means originality) or a patent (in this case, finding an inventive or non-obvious solution with demonstrable utility or industrial applicability) requires us to examine the issue of *human-machine collaboration*. Human-machine cooperation is possible, and it does not preclude proximate cause. For example, if I ask a GenAI machine to edit or translate a text I have written, the creative choices I made to produce that text do not disappear after the GenAI machine has made changes. As we will see in the next Part, the question of whether the human input “carries over” to the machine’s output can be answered, but it requires a nuanced, well-calibrated approach.

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62. According to some experts, very large GenAI models are approaching and may soon surpass human or general intelligence (AGI), including an ability to solve complex problems. See Jeremy Baum & John Villasenor, *How Close Are We to AI that Surpasses Human Intelligence?*, BROOKINGS INST. (July 18, 2023), <https://www.brookings.edu/articles/how-close-are-we-to-ai-that-surpasses-human-intelligence/>.

63. Assuming that this is the same company, which simplifies the analysis, up to a point. An AI model could be made available for others to train, as Meta did by releasing its AI source code. See Emilia David, *Meta’s AI Research Head Wants Open Source Licensing to Change*, VERGE (Oct. 30, 2023), <https://www.theverge.com/2023/10/30/23935587/meta-generative-ai-models-open-source> (noting that “Meta’s AI research group wants to keep releasing models for free despite criticism that Llama 2 isn’t open enough.”).

64. See Lemley, *supra* note 59, at 197 (“[P]rompts don’t own the ideas they contribute and AIs can’t own the expression they contribute.”).

### III. APPLICATION OF CURRENT INTELLECTUAL PROPERTY NORMS

As we begin Part III, I will note that granting rights to productions that look like copyrighted works or patentable inventions, but are made by machines, strikes the author of this Article as a new Turing test.<sup>65</sup> Normatively, it would amount to rewarding a machine for its ability to masquerade as a human. Surely an illusion cannot be a solid normative basis for obtaining intellectual property protection.<sup>66</sup> As this Part explains, one must be careful to avoid smoke and mirrors when building doctrinal bridges between first- and second-degree IP.

The discussion of the application of existing IP (copyrights, designs, and patents) to GenAI is best done by separating copyrights on the one hand from patents and designs on the other, for reasons that will become clear below.

#### A. COPYRIGHT

The discussion in this Part assumes, as both the U.S. Copyright Office and U.S. courts have, that a human author is required for a work to be protected by copyright.<sup>67</sup> This is the view espoused by Professor Samuelson in her luminous piece on the topic.<sup>68</sup> In other words, a human being must be the source of the creative decisions that produce the originality that is required to qualify for copyright protection.<sup>69</sup> The primary concern regarding GenAI output of a literary or artistic nature is not the copyrightability of the prompt itself. Rather, the crucial question is whether the prompts and subsequent

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65. That may remind the reader of the “Turing test,” a set of questions asked via teletype on any subject whatsoever. Unbeknownst to the questioner, some were answered by a human; others by a machine. Both the human being and the machine attempted to convince the questioner that it or she is the human and the other is not. *See* Lawrence B. Solum, *Legal Personhood for Artificial Intelligences*, 70 N.C. L. REV. 1231, 1236 (1992).

66. *See* Gervais, *supra* note 5, at 24.

67. *See* Thaler v. Perlmutter, 687 F. Supp. 3d 140 (D.D.C. 2023).

68. *See* Samuelson, *supra* note 8, at 1224.

69. *See* U.S. COPYRIGHT OFF., COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICES § 306 (3rd ed. 2021) (“The U.S. Copyright Office will register an original work of authorship, provided that the work was created by a human being.”); *see also* RESTATEMENT OF THE L., COPYRIGHT § 7 cmt. c (AM. L. INST., Tentative Draft No. 2 Rev., 2022) (“Choices need not be artistic or aesthetic in nature in order to meet the minimal-creativity requirement for a work to be original. But choices do not reflect an author’s creative expression if they are merely routine (e.g., the choice to organize a directory in alphabetical order), or if they are significantly constrained by external factors.”).

“discussion” with the GenAI system can provide the necessary elements for the output to possess originality and demonstrate human proximate cause.<sup>70</sup>

Both U.S. and international copyright law assert that copyright does not protect ideas.<sup>71</sup> Thus, if a GenAI output merely reflects ideas contained in the prompt(s), this should not be sufficient to create a copyrightable work. Originality, and the minimum threshold of creativity it requires (in the United States, as a constitutional matter), is measured by the author’s *expression*, not her ideas.<sup>72</sup> Therefore, the search for originality should continue based on author expression. For example, if the prompt(s) instruct the machine to change certain sentences in a text, a chord sequence, etc., in a very specific way, and those changes themselves are sufficient to produce originality, then it is possible that the output has originality arising from a human proximate cause. This is where things get tricky and, as a recent court decision in China shows, potentially confusing.<sup>73</sup> A very detailed prompt containing the outline of a story, for example, is an idea; its expression in a GenAI output would therefore be the autonomous production of the machine (devoid of human creative choices).<sup>74</sup> In other words, in most cases a prompt or series of prompts that might themselves be original will transfer ideas, not protectable expression, to the output.<sup>75</sup> Selecting one output among many would not constitute a source of originality, any more than selecting a painting in a large art gallery would.<sup>76</sup> A human claiming to be an author of a machine output

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70. There is an interesting question about infringement of prompts. If two GenAI outputs are substantially similar, should we assume that the prompts were also substantially similar? Will prompts be retained so that this evidence can be produced in court? It seems likely that the answer to both questions is negative. See Lemley, *supra* note 64.

71. For example, article 9.2 of the Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, Legal Instruments—Results of the Uruguay Round vol. 31, 33 I.L.M. 81 (1994), provides that “[c]opyright protection shall extend to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such.” The TRIPS Agreement was approved by Congress. See Uruguay Round Agreements Act, Pub. L. No. 103-465, §§ 101–03, 108 Stat. 4809 (1994). Then in terms of national law, 17 U.S.C. § 102(b) provides in part that “[i]n no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery . . .”.

72. On the constitutional matter, see *Feist*, 499 U.S. at 346.

73. See Aaron Wininger, *Beijing Internet Court Releases Translation of Li vs. Liu Recognizing Copyright in Generative AI*, CHINA IP L. UPDATE (Jan. 22, 2024), <https://www.chinaiplawupdate.com/2024/01/beijing-internet-court-releases-translation-of-li-vs-liu-recognizing-copyright-in-generative-ai/>.

74. See Lemley, *supra* note 64.

75. See *id.*

76. It may take a lot of time and effort, but this would amount to a return to sweat of the brow, which the Supreme Court clearly discarded in *Feist*. There is a perhaps misunderstood notion of “selection and arrangement” at play here. As the Supreme Court



would have to demonstrate that original expressive choices in the prompt(s)—not mere ideas—are contained in the output.

## B. PATENTS

Just as a machine cannot be an author, it cannot be an inventor as a matter of law.<sup>77</sup> However, patents are different. To quote Professor Samuelson, “[o]nly those stuck in the doctrinal mud could even think that computers could be ‘authors.’”<sup>78</sup> While as explained in the previous Section there is no compelling reason to provide copyright protection for the 10,000 songs, texts, videos, or images that an LLM might have produced while you are reading this Article, and several reasons not to do so, the same reasons do not apply—at least not in the same way—to patents.

AI is now routinely used to accelerate and reduce the cost of pharmaceutical research by performing *in silico* research.<sup>79</sup> AI machines can find hidden patterns in large data sets and automate many predictions.<sup>80</sup> Applications of AI in pharmaceutical research include disease diagnosis, predicting drug efficacy,<sup>81</sup> and assisting in drug design.<sup>82</sup> AI machines can select which molecules have suitable properties to attack biological targets of interest.<sup>83</sup> AI can identify the optimal chemical structures to reduce toxicity and meet metabolic requirements, both of which can be costly and data-intensive.<sup>84</sup> They can improve the field of personalized medicine based on

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explained in *Feist*, selection and arrangement” may be a source of originality. But it applies to *compilations*, not selecting one object out of a pile. As stated in *Feist*, 499 U.S. at 357: the statute identifies three distinct elements and requires each to be met for a work to qualify as a copyrightable compilation: (1) the collection and assembly of pre-existing material, facts, or data; (2) the selection, coordination, or arrangement of those materials; and (3) the creation, by virtue of the particular selection, coordination, or arrangement, of an “original” work of authorship.

77. See *Beech Aircraft Corp. v. EDO Corp.*, 990 F.2d 1237, 1248 (Fed. Cir. 1993) (“[O]nly natural persons can be ‘inventors.’”); see also Dan L. Burk, *AI Patents and the Self-Assembling Machine*, 105 MINN. L. REV. HEADNOTES 301, 303 (2021).

78. Samuelson, *supra* note 8, at 1200 (internal citations omitted).

79. See Nic Fleming, *How Artificial Intelligence Is Changing Drug Discovery*, 557 NATURE 55 (2018).

80. See generally AJAY AGRAWAL, JOSHUA GANS & AVI GOLDFARB, PREDICTION MACHINES, UPDATED AND EXPANDED: THE SIMPLE ECONOMICS OF ARTIFICIAL INTELLIGENCE (Harv. Bus. Rev. Press, 2022).

81. See Gregor Gunčar, Matijaž Kukar, Mateja Notar, Miran Brvar, Peter Černelč, Manca Notar & Marko Notar, *An Application of Machine Learning to Haematological Diagnosis*, 8 SCI. REP. (2018).

82. See Hongming Chen, Ola Engkvist, Yinhai Wang, Marcus Olivecrona & Thomas Blaschke, *The Rise of Deep Learning in Drug Discovery*, 23 DRUG DISCOVERY TODAY, 1241 (2018).

83. See *id.*

84. See *id.*

genetic markers.<sup>85</sup> In other words, machines can both identify novel compounds and other subject matter and in many cases, predict efficacy, which could be sufficient to meet the utility requirement.<sup>86</sup> The potential of AI to identify novel drugs that human researchers alone cannot discover has attracted investment from both startups and established pharmaceutical companies.<sup>87</sup> Though it may have been a publicity stunt, Google's announcement that its AI machines can both make new inventions and apply for patents was also noteworthy.<sup>88</sup>

Still, U.S. law requires that a human inventor to be named on the application for an invention to be patentable.<sup>89</sup> The consequences of naming on the application one or more persons who did not actually invent are unclear in this context, but if none of the named inventors is actually an inventor, the patent, if granted, would be subject to invalidation for lack of human invention.<sup>90</sup>

The equation to be solved here, with respect to patents, is whether granting patents on "inventions" without a human inventor, that is, inventions without a human cause as defined above, is beneficial under the illumination of the normative lodestar: human progress. Will machines produce tens of thousands of small, incremental innovations and clog the patent office and courts, trolling for every possible application of myriad technologies? Would this add little if any value and could cause great disruption, as trolling is known to do?<sup>91</sup> Or

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85. See Kit-Kay Mak & Mallikarjuna Rao Pichika, *Artificial Intelligence in Drug Development: Present Status and Future Prospects*, 24 DRUG DISCOVERY TODAY 773 (2019).

86. See *In re Brana*, 51 F.3d 1560, 1568 (Fed. Cir. 1995) ("Usefulness in patent law, and in particular in the context of pharmaceutical inventions, necessarily includes the expectation of further research and development. The stage at which an invention in this field becomes useful is well before it is ready to be administered to humans.").

87. See Bowen Lou & Lynn Wu, *AI on Drugs: Can Artificial Intelligence Accelerate Drug Development? Evidence from a Large-Scale Examination of Bio-Pharma Firms*, (Mar. 15, 2021) (MISQ Forthcoming), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3524985](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3524985).

88. See Rose Hughes, *DeepMind: First Major AI Patent Filings Revealed*, IPKAT (June 7, 2018), <http://ipkitten.blogspot.com/2018/06/deepmind-first-major-ai-patent-filings.html>. The reverse use of AI is true; namely, to defeat patent applications—based on obviousness (to an AI expert) or novelty—by massive preemptive public disclosure of novel subject matter together with its utility. On the former, see Ryan Abbott, *Everything Is Obvious*, 66 UCLA L. REV. 2, 40 (2019). On the latter issue, see Daniel Gervais, *Exploring the Interfaces Between Big Data and Intellectual Property Law*, 10 J. INTELL. PROP., INFO. TECH., & ELEC. COM. L. (2019), <https://www.jipitec.eu/issues/jipitec-10-1-2019/4875>.

89. Thaler, 43 F.4th at 1211 ("Our holding today that an 'inventor' must be a human being is supported by our own precedent. . . . [Previous] cases confirm that the plain meaning of 'inventor' in the Patent Act is limited to natural persons."); see also *supra* note 77.

90. See Thaler, 43 F.4th at 1211.

91. See Mark A. Lemley & A. Douglas Melamed, *Missing the Forest for the Trolls*, 113 COLUM. L. REV. 2117, 2119 (2013) (describing harms caused by patent trolling).

can we delineate a domain of ‘machine innovation’ that avoids these harms and still manages to increase overall welfare?

#### IV. A PATH FORWARD

Let us start with patents. In the context of GenAI, what if a machine proposes a solution in an output that seems like patentable or copyrightable subject-matter? When a GenAI system generates output that appears to constitute patentability or copyrightable subject matter, it necessitates a reevaluation of the legal concepts of authorship and inventorship. This analysis must distinguish between traditional “first-degree” intellectual property created directly by humans and a potential new category of “second-degree” intellectual property produced by AI systems, while excluding from this latter category any output that ultimately traces back to direct human creativity.

##### A. HUMAN-MACHINE COLLABORATION

An inventor is typically not the person(s) who identified a problem, but the person who identified the solution.<sup>92</sup> A human posing a series of “what if” questions in a “discussion” with GenAI could be either. They could ask the machine to look at the problem from a different angle, but then any solution generated by the machine would have the machine as its “inventor.” On the other hand, if the “what if” prompt contains a possible solution, and the prompt asks the AI machine to test it, then the inventor could be the human author of the prompt(s). What happens if there is no such human inventor?

In copyright law, human-machine collaboration is already a reality.<sup>93</sup> As the U.S. Copyright Office noted, the use of AI does not prevent subject-matter that belongs to the field of copyright (essentially, literary, and artistic works) to be protected if there are enough creative choices in the expressive output.<sup>94</sup> The case for a transfer of any originality in the prompt(s) to the output is likely to be a rare case, as prompts are best seen as ideas turned into a form of “expression” by the machine.<sup>95</sup> One could see a prompt containing specific expression that the machine would use in the output. A simple example would

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92. See *Burroughs Wellcome Co. v. Barr Lab’ys, Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994) (“An idea is definite and permanent when the inventor has a specific, settled idea, a particular solution to the problem at hand . . .”).

93. See Atilla Kasap, *Copyright and Creative Artificial Intelligence (AI) Systems: A Twenty-First Century Approach to Authorship of AI-Generated Works in the United States*, 19 WAKE FOREST J. BUS. & INTELL. PROP. L. 335, 363 (2019) (“Computers have already been effectively and widely employed in creative industries and machine and human collaboration has resulted in more creative works being published.”).

94. See U.S. COPYRIGHT OFF., *supra* note 69.

95. See Lemley, *supra* note 64.

be a prompt providing text embodying a sufficient degree of originality that the machine would be instructed to use. Then, the caselaw concerning copying of less than the exact expression but more than just the ideas would inform the analysis of whether the originality transfer from the prompt(s) has occurred.<sup>96</sup>

## B. IS THERE A CASE FOR SECOND-DEGREE IP?

Based on existing normative foundations for intellectual property, there are, to simplify, two broad categories of reasons why courts or Congress would expand IP protections to second-degree (or third-degree, fourth-degree, and so on) outputs. First, someone (or something) should be rewarded for an inventive or creative contribution. In the case of second-degree IP, this would “over-reward[] the programmer, particularly in light of the fact that the programmer is no more able to anticipate the output than anyone else.”<sup>97</sup> Given the black-box nature of LLMs, for example, Professor Samuelson’s comment seems even more apt now than when it was first made. Moreover, any argument that the machine somehow “deserves” rights is best left for the day—if it ever comes—when machines become legal subjects.<sup>98</sup>

Further, we should want to encourage machines to make useful contributions by providing IP rights. Copyright and patent protection are not free: they translate into higher prices for users and consumers.<sup>99</sup> Why should we (collectively) subsidize those who build, program, train, and/or use AI machines in this way? To do so, this Essay argues, we must show that societal outcomes will improve. This could be done, for example, by identifying a lack of or underinvestment in AI, and in LLMs in particular, combined with a credible demonstration that more investment is likely to lead to these kinds of

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96. *E.g.*, *Country Kids ‘N City Slicks, Inc. v. Sheen*, 77 F.3d 1280, 1285 (10th Cir. 1996) (In distinguishing idea from expression, “copyright law seeks to achieve a proper balance between competition based on public ideas and incentive to produce original work.”); *see also* PAUL GOLDSTEIN, *GOLDSTEIN ON COPYRIGHT* § 2.3.1 (Wolters Kluwer, 3rd ed. 2005) (“‘Idea’ and ‘expression’ are best viewed not as precise pigeonholes, but as metaphors for a work’s unprotected and protected elements, respectively.”).

97. *See* Samuelson, *supra* note 8, at 1208.

98. *See generally* DAVID J. GUNKEL, *PERSON, THING, ROBOT* (2023) (describing various paths to legal personhood for AI machines); Daniel J. Gervais & John J. Nay, *Artificial Intelligence and Interspecific Law*, 382 *SCIENCE* 376 (Oct. 2023) (explaining how AI could operate legal entities such as LLCs and how the legal system must adapt to autonomous AI agents).

99. *See* WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW* 11 (2003) (“[L]egal protection against copying, by enabling the creator of the intellectual property to charge a price per copies (of which his property right makes him a monopolist) in excess of the marginal cost, prevents access to (use of) the intellectual property by persons who value the access at more than the marginal cost but less than the price.”). For patent law, *see id.*, at 74–75.

positive outcomes. At the time of writing, it seems particularly difficult to argue at least the first point, leaving the second highly contingent.<sup>100</sup> A dangerous argument lurking in the shadows of this discussion is the “if value, then right” trope.<sup>101</sup> This is in no way a valid argument; it is merely a manipulative maneuver based on a vague restitutionary impulse, and needs to be firmly rejected.<sup>102</sup> Einstein’s  $E = mc^2$  certainly had an enormous “value” of some kind, but IP law does not protect it.<sup>103</sup> Indeed, large investments are often made to discover laws of nature, stars, or new plants or species, but none of these can be protected by exclusive rights.<sup>104</sup>

As noted above, there is no argument based on either authorial justification theories (such as “desert”) or societal benefits for granting copyright protection to outputs without human cause, given that machines can produce tens of thousands of elements of a literary or artistic nature and have done so without the need for an incentive.<sup>105</sup> In the patent area, the challenge will be to identify and then properly delineate areas where the patent incentive may produce beneficial welfare effects when applied to machine outputs.

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100. See, e.g., Harlem Capital, *Generative AI: The VC Landscape*, <https://harlem.capital/generative-ai-the-vc-landscape/> (“Venture activity in the AI space has witnessed remarkable growth, particularly in Generative AI, which has attracted significant attention from investors. Startups in the field have received a substantial amount of funding, surpassing \$9 billion globally in the last two full years, with H1 2023 already blowing that out of the water (~\$15 billion globally).”).

101. See Alfred C. Yen, *Brief Thoughts About If Value Then Right*, 99 B.U. L. REV. 2479, 2480–81 (2019) (“That principle, which the U.S. Copyright Act does not embrace, expresses the intuition that ‘wherever value is received, a legal duty to pay arises, regardless of whether imposing that legal duty serves public welfare.’ . . . Courts do not directly cite the principle, but they follow it in problematically expansive copyright decisions that consider copying sufficient to establish infringement.”).

102. See Wendy J. Gordon, *On Owning Information: Intellectual Property and the Restitutionary Impulse*, 78 VA. L. REV. 149, 178 (1992) (criticizing the “if value, then right” argument).

103. See *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980) (“[A] new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that  $E=mc^2$ ; nor could Newton have patented the law of gravity. Such discoveries are ‘manifestations of . . . nature, free to all men and reserved exclusively to none.’) (quoting *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 33 U.S. 127 130 (1948)).

104. Examples would include the Hubble telescope, reported to have cost \$16 billion (in 2021 dollars), or the planned new particle collider to be built at the border between France and Switzerland, with a price tag of \$17 billion. See NASA, *Hubble FAQs*, <https://science.nasa.gov/mission/hubble/overview/faqs/>; Pierre Celerier, *Plan for Europe’s Huge New Particle Collider Takes Shape*, PHYS.ORG (Feb. 5, 2024), <https://phys.org/news/2024-02-europe-huge-particle-collider.html>.

105. See Burk, *supra* note 6 and accompanying text.

### C. APPLICABLE TEST

The policy choice advocated in this Article, namely to stay the course and avoid creating second-degree IP—at least until a showing has been made that it should exist—requires identifying sufficient human proximate cause in cases of collaboration between a human creator or inventor and an AI machine. But it comes with a twist in patent law.

#### 1. *Copyright Law*

Copyright protects many types of copyrighted works that contain unprotectable elements or elements that are owned by someone else. For example, a translator contributes originality, but the translated work has a different author. If the derivative work (translation) is authorized, the translator owns the copyright in it.<sup>106</sup> Protection of a work based on a pre-existing public domain work is similarly limited to the new expressive elements added by the new author.<sup>107</sup> Courts can and should apply the existing test to separate elements with a human proximate cause from those that were generated by the AI machine.<sup>108</sup> In doing so, they must carefully assess whether the human contribution is at the level of (unprotectable) ideas or actual expressive elements.

One must also avoid the pitfalls of reading too much into “selection and arrangement.”<sup>109</sup> Selecting one or a few outputs from a machine that produces many more is simply not a form of authorship. Consider this simple example: suppose someone is looking for a painting depicting a scene from the African savannah. Fortunately, this person lives near an art gallery that specializes in this type of art and sells over a hundred potentially interesting paintings. The

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106. *See, e.g.*, *Olympia Press v. Lancer Books, Inc.*, 267 F. Supp. 920, 922 (S.D.N.Y. 1967) (holding that the English translation of a French work is a new, copyrightable work).

107. *See Warner Bros. Ent. v. X One X Prods.*, 644 F.3d 584, 596–97 (8th Cir. 2011) (“[I]f material related to certain characters is in the public domain, but later works covered by copyright add new aspects to those characters, a work developed from the public domain material infringes the copyrights in the later works to the extent that it incorporates aspects of the characters developed solely in those later works.”).

108. *See id.* at 597 (“[W]e must determine (1) the apparent scope of the copyrights in the later works (here, the films), (2) the scope of the material dedicated to the public in the publicity materials, which correspondingly limits the scope of the film copyrights, and (3) the scope into which each of [the Defendant’s] images falls.”).

109. *See generally Feist*, 499 U.S. at 358; *see also* RESTATEMENT OF THE L., COPYRIGHT § 7 cmt. b (AM. L. INST., Tentative Draft No. 2 Rev., 2022) (“In the case of a compilation, an author’s choices regarding selection, coordination, or arrangement of preexisting material can be minimally creative, even if the material selected, coordinated, or arranged is not itself original to the author.”).

person spends two hours looking at the paintings and chooses one. This person, this Article argues, is not an author.<sup>110</sup>

Finally, it is also worth noting that if AI machines, their programmers or “trainers” were considered authors of results (i.e., if we were to recognize second-degree IP), then these works could not be joint works in most cases, because the creation of a joint work requires an intent to collaborate in order to create a joint work.<sup>111</sup> Under the 1976 Copyright Act, this intent must exist at the time of creation.<sup>112</sup>

## 2. Patent Law

Under current patent law, the contribution of each claimed inventor must be identified.<sup>113</sup> This logically assumes that we know who, or *what*, the inventor is. As the Federal Circuit noted, a “party may raise the defense that a patent is invalid for failing to name the correct inventors” under 35 U.S.C. § 102(f), which provides that a person shall be entitled to a patent unless “he did not himself invent the subject matter sought to be patented.”<sup>114</sup> The Federal Circuit explained co-inventorship as follows:

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110. Naturally, there could be “arrangement” copyright if the person selected several paintings and arranged them in some original way, but that copyright would not apply to the paintings, only the arrangements. This is well illustrated by this example from the Restatement: Editor creates a book containing what she believes are Emily Dickinson’s 20 best poems. Editor has made an at least minimally creative selection by choosing among the many poems that could have been included and the book therefore meets the minimal-creativity requirement for copyright protection. Copyright protection for book does not protect the individual poems, only their selection and arrangement by Editor. RESTATEMENT OF THE L., COPYRIGHT § 7 cmt. c, illus. 11 (AM. L. INST., Tentative Draft No. 2 Rev., 2022).

111. 17 U.S.C. § 101 defines a “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.” (emphasis added). See Jane C. Ginsburg & Luke Ali Budiardjo, *Authors and Machines*, 34 BERKELEY TECH. L.J. 343, 382 (2019) (“[S]ome commentators contend that ‘intent to merge’ requires neither actual collaboration nor even knowledge of one’s putative co-author . . . . But this scenario seems to collapse the distinction between joint works and derivative works, a distinction the legislative history seeks to maintain.”).

112. See *Batiste v. Island Recs., Inc.*, 179 F.3d 217, 222 n.7 (5th Cir. 1999) (noting that in the 1976 Act Congress overruled previous cases such as *Shapiro, Bernstein & Co. v. Jerry Vogel Music Co.*, 221 F.2d 569 (2d Cir. 1955), allowing a later developed intent to merge contributions into a unitary whole to qualify the contributions as creating a joint work).

113. See *Ethicon, Inc. v. U.S. Surgical Corp.*, 135 F.3d 1456, 1460 (Fed. Cir. 1998) (“[E]ach of the joint inventors need not ‘make the same type or amount of contribution’ to the invention. 35 U.S.C. § 116. Rather, each needs to perform only a part of the task which produces the invention. On the other hand, one does not qualify as a joint inventor by merely assisting the actual inventor after conception of the claimed invention.”).

114. 35 U.S.C. § 102(f). See *Pannu v. Iolab Corp.*, 155 F.3d 1344, 1348–50 (Fed. Cir. 1998).

Because ‘[c]onception is the touchstone of inventorship,’ each joint inventor must generally contribute to the conception of the invention. ‘Conception is the ‘formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice.’ An idea is sufficiently “definite and permanent” when “only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation. The conceived invention must include every feature of the subject matter claimed in the patent. Nevertheless, for the conception of a joint invention, each of the joint inventors need not “make the same type or amount of contribution” to the invention. 35 U.S.C. § 116. Rather, each needs to perform only a part of the task which produces the invention. On the other hand, one does not qualify as a joint inventor by merely assisting the actual inventor after conception of the claimed invention. One who simply provides the inventor with well-known principles or explains the state of the art without ever having ‘a firm and definite idea’ of the claimed combination as a whole does not qualify as a joint inventor. Furthermore, a co-inventor need not make a contribution to every claim of a patent. See 35 U.S.C. § 116. A contribution to one claim is enough.<sup>115</sup>

Thus, each inventor must contribute to the conception, i.e., a definite or enduring “idea of the complete and operative” of each feature of the claimed invention (though not of each individual claim); such contribution by a human inventor is necessary for a valid patent to issue.<sup>116</sup>

The possibility of massive trolling should be considered.<sup>117</sup> Just as LLMs can produce thousands of texts, songs or images in a very short time, they can process all published patents and patent applications, scientific and medical journals, and other sources of information and identify incremental innovations and predict their utility.<sup>118</sup> So the present seems clear: a human inventor, someone causally related to the purpose of the invention, is needed for an invention to be patentable. The real question for the future is: are there cases where we should disregard the lack of human inventorship? What would be the benefit, not to the user of the machine, but to society at large (those who pay the possible patent rent), of granting exclusive rights in such a situation? The Essay is agnostic on this question, since the answer depends to a large extent on empirical data that this author, at least, does not possess.

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115. *Ethicon*, 135 F.3d at 1460.

116. *See supra* note 77.

117. *See* Lemley & Melamed, *supra* note 91.

118. *See* Schwein, *supra* note 20.



In the interim, it will be messy. Given the exponential growth in the use of AI in various fields of technology, it is likely that many patent applications will name one or more human inventors who are not actual inventors.<sup>119</sup> As noted above, this can lead to invalidation, and an explosion of litigation in this area is predictable as courts begin to analyze human and artificial contributions to a claimed invention.<sup>120</sup> The answer is *not* to claim a machine as an inventor—although that gets an A for honesty—but rather to refuse to grant second-degree patents until it has been demonstrated that we would be collectively better off if we did. And that day may well come, but such protection, the granting for the first time of second-degree intellectual property rights, should be based on a systematic analysis of data on a broad scale, not anecdota.

## V. CONCLUSION

The normative fog surrounding the protection of the output of AI machines by intellectual property rights can be lifted. Machines are not authors. Period. This means that a literary or artistic output produced by a machine without a human cause, as defined in this Essay, is not protected. When a human and a machine “work together,” we look for the human input into the expressive output, keeping in mind that ideas are not protected by copyright. The jurisprudence on the transfer of originality (of expression) through one or a series of prompts and fine-tuning efforts from a human author to the output has yet to emerge, but the test is clear.

The issue is different with patents for at least two reasons. First, any argument about the nature of authorial creativity is inapplicable, and authorship is essential to creating originality. It is a *sine qua non*. Inventorship (by one or more people) is a different doctrine because, first, misidentification of the inventor does not necessarily mean absence of invention, while absence of authorship means absence of a protectable “work.” Misidentification of an inventor can be remedied. Second, and perhaps more importantly from a normative standpoint, there are the risks associated with protecting facially copyrighted machine outputs produced by the tens of thousands (now without any copyright incentive), including massive trolling and the potentially

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119. See Ryan Abbott, *I Think, Therefore I Invent: Creative Computers and the Future of Patent Law*, 57 B.C. L. REV. 1079, 1098 (2016) (providing examples of patents granted on machine-made “inventions”).

120. Although the statute provides a fair degree of flexibility on correcting inventorship, absence of human inventorship does not seem to be a minor “technical” defect. See 37 C.F.R. § 1.324 (2020) (outlining requirements to correct inventorship in an issued patent); 37 C.F.R. § 1.48 (outlining requirements to correct inventorship in a patent application); *Canon Comput. Sys., Inc. v. Nu-Kote Int’l, Inc.*, 134 F.3d 1085, 1089 (Fed. Cir. 1998) (explaining incorrect inventorship as “a technical defect in a patent that may be easily curable”).

irreversible displacement of human authors. The case has certainly not been made that we would be better off with copyright protection of these outputs. But with patents, perhaps the case can be made. Whether the risks (including trolling, massive increase in minimally inventive patent applications) outweigh the benefits is a call this Essay cannot make without further empirical analysis.