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Creativity Revisited

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CREATIVITY REVISITED

RALPH D. CLIFFORD¹

It's beautiful, but it's not art. Humans create art by their own violence, by their own volition.²

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I. THE SCHOLARSHIP REVISITED

The University of New Hampshire's Scholarship Redux Conference invited a reexamination of an earlier work of IP scholarship to address what has happened in the

¹ Professor of Law, University of Massachusetts School of Law. The author wishes to thank the Franklin Pierce Center for Intellectual Property at the University of New Hampshire School of Law for inviting me to present this paper at its 2018 Scholarship Redux conference and for all that UNH Law does to support IP scholars.

² FRANK HERBERT, CHILDREN OF DUNE 124 (Berkley ed. 1976).

area since the time of its original publication.³ As my contribution to the Conference, I revisited my 1997 article that discussed the consequences of the increasing sophistication of artificial intelligence (“AI”) on the production of new copyrightable or patentable works⁴ as well as the follow-up article I published in 2004 that focused expressly on copyright law.⁵ The primary call of the conference was to discuss the “legal predictions [that were] right—or wrong!”⁶ In line with the call, this essay will present both the wins and losses from my earlier scholarship and will then suggest where future research is needed.

II. PREDICTIONS THAT WERE RIGHT

The basic thesis of the articles is that computer-generated works fail to qualify for intellectual property protection where the source of the work’s underlying creativity is computer-generated. In *Creative Programs*, this assertion was stated as:

[T]he ultimate question [is] who can claim a copyright in the expressive works fixed by [a creative computer program]? The claim of the user of the [program] seems highly dubious. The user was not the originator of [the] expression[] as no specific creative effort was exerted by the user. Consequently, a claim of

³ See *The Intellectual Property Scholarship Redux Conference*, UNIVERSITY OF NEW HAMPSHIRE SCHOOL OF LAW, <https://law.unh.edu/event/2018/04/intellectual-property-scholarship-redux-conference> (last visited Mar. 11, 2018) [hereinafter *Redux Conference*].

⁴ Ralph D. Clifford, *Intellectual Property in the Era of the Creative Computer Program: Will the True Creator Please Stand Up?*, 71 TUL. L. REV. 1675 (1997) [hereinafter Clifford, *Creative Programs*].

⁵ Ralph D. Clifford, *Random Numbers, Chaos Theory, and Cogitation: A Search for the Minimal Creativity Standard in Copyright Law*, 82 DENVER U. L. REV. 259 (2004) [hereinafter Clifford, *Copyright Creativity*].

⁶ See *Redux Conference*, *supra* note 3.

authorship by the user is unsustainable. Similarly, the [creative computer program] itself is not able to claim the copyright because such claims are limited to humans. The answer to the ultimate question, therefore, is “no one.” Without a claimant, the work presumably enters the public domain.⁷

Scholars have examined this area numerous times since the articles were released. Most of these scholars—particularly those who were examining copyright law—agreed with the primary thesis that computer-generated works are not subject to protection.⁸ This is also the position of the Copyright Office.⁹ Only a few scholars have

⁷ Clifford, *Creative Programs*, *supra* note 4, at 1695 (citations omitted); *accord* Clifford, *Copyright Creativity*, *supra* note 5, at 260. It should be noted that neither article asserted that the developing power of AI technology suggested that computers (or animals) should be recognized as creative or legal actors. See Carla L. Reyes, *Conceptualizing Cryptolaw*, 96 NEB. L. REV. 384, 425 n.224 (2017); Dane E. Johnson, *Statute of Anne-Imals: Should Copyright Protect Sentient Nonhuman Creators?*, 15 ANIMAL L. 15, 20 (2008). Indeed, the primary conclusion of both of my articles was that no *thing* has the right to claim U.S. intellectual property protection; instead, human-based creativity leading to the work is a prerequisite.

⁸ See Amir H. Khoury, *Intellectual Property Rights for “Hubots”: On the Legal Implications of Human-Like Robots As Innovators and Creators*, 35 CARDOZO ARTS & ENT. L.J. 635, 651 (2017); 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 (2016); Jani McCutcheon, *The Vanishing Author in Computer-Generated Works: A Critical Analysis of Recent Australian Case Law*, 36 MELB. U. L. REV. 915, 931 (2013) (discussing Australian law); Annemarie Bridy, *Coding Creativity: Copyright and the Artificially Intelligent Author*, 2012 STAN. TECH. L. REV. 5, ¶ 51 (2012); Charles Cronin, *Virtual Music Scores, Copyright and the Promotion of a Marginalized Technology*, 28 COLUM. J.L. & ARTS 1, 18 (2004); David Nimmer, *Copyright in the Dead Sea Scrolls: Authorship and Originality*, 38 HOUS. L. REV. 1, 32 (2001).

⁹ See U.S. COPYRIGHT OFFICE, COMPENDIUM OF COPYRIGHT OFFICE PRACTICES § 306 (3d ed. 2017), <https://www.copyright.gov/comp3/> (“[T]he Office will refuse to register a claim if it determines that a human being did not create the work.”).

dissented¹⁰ as have a few students.¹¹ Courts have not addressed computer-based A.I. generated works (yet), but have found that the copyright statute requires a human rather than another animal as author for protection to be available.¹² The court’s logic would seem to apply with equal or greater force to computer-generated works. In sum, nothing that has happened since 1997 changes my conclusion that a human author or inventor is needed for protection.

The other aspect of the articles that was clearly correct was the prediction that the use of AI technology would become increasingly common.¹³ In fact, this is happening.¹⁴ The technology is becoming more capable as its algorithms are refined and as the processing power of the underlying computers increases.¹⁵ Its use in the main-stream laboratory is acknowledged as part of—or a replacement

¹⁰ See Ryan Abbott, *I Think, Therefore I Invent: Creative Computers and the Future of Patent Law*, 57 B.C. L. REV. 1079, 1081 (2016); Robert C. Denicola, *Ex Machina: Copyright Protection for Computer-Generated Works*, 69 RUTGERS U.L. REV. 251, 275 (2016); Schuster, W. Michael, *A Coasean Analysis of Ownership of Patents for Inventions Created by Artificial Intelligence*, 75 WASH. AND LEE L.R. (forthcoming 2018) (manuscript at 14), <https://ssrn.com/abstract=3132753>.

¹¹ See Russ Pearlman, Comment, *Recognizing Artificial Intelligence (AI) as Authors and Inventors Under U.S. Intellectual Property Law*, 24 RICH. J.L. & TECH. 2, 3 (2018); William T. Ralston, Comment, *Copyright in Computer-Composed Music: Hal Meets Handel*, 52 J. COPYRIGHT SOC’Y U.S.A. 281, 293 (2005).

¹² See *Naruto v. Slater*, 888 F.3d 418, 426 (9th Cir. 2018) (“[A]nimals other than humans lack statutory standing to sue under the Copyright Act.”).

¹³ See Clifford, *Copyright Creativity*, *supra* note 5, at 260 n.5.

¹⁴ See, e.g., Iprova, *Artificial Intelligence Used for New Inventions Unveiled*, IPROVA (Sept. 20, 2017), <https://www.iprova.com/news/artificial-intelligence-used-for-new-inventions-unveiled/>.

¹⁵ See Chris Edwards, *Deep Learning Hunts for Signals Among the Noise*, COMM. ACM, June 2018, at 13; Diana Kwon, *Self-Taught Robots*, SCI. AMER., March 2018, at 26; David Pogue, *The Robotic Artist Problem*, SCI. AMER., Feb. 2018, at 23; Ben Dickson, *Can Artificial Intelligence Be Truly Creative*, PC MAG., Jan. 2018, at 93.

for—human innovation.¹⁶ A good example of this is the LED invention described in the University of California San Diego’s press release.¹⁷ According to the release, the new chemical composition for an LED was “discovered using a systematic, high-throughput computational approach” that “predict[ed]” the composition of it.¹⁸ Having been given the conception of the new device by the computer, the human inventors then “figured out the recipe needed to make the new phosphor.”¹⁹ In other words, half of the inventive process—conception—was predominantly not human-based while the reduction to practice was the opposite.²⁰ This computer-human combination where the computer innovates and the human implements is becoming common.²¹

¹⁶ See, e.g., Press Release, Univ. Cal. San Diego, Supercomputers Aid Discovery of New, Inexpensive Material to Make LEDs with Excellent Color Quality (Feb. 19, 2018), http://jacobsschool.ucsd.edu/news/news_releases/release.sfe?id=2476 [hereinafter Press Release]. The “invention” described in the Press Release has been claimed for patent. E-mail from Shyue Ping Ong, Assoc. Prof., Univ. Cal. San Diego, to author (May 23, 2018, 18:30 EST) (on file with author).

¹⁷ Press Release, *supra* note 16.

¹⁸ *Id.*

¹⁹ *Id.*

²⁰ See, e.g., *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986) (“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.” (internal quotation marks and citations omitted)). For the UCSD LED, the conception was formed in the computer and was provided, fully formed, to the human “inventor.” As Clifford, *Copyright Creativity*, *supra* note 5, at 294, argues, “claiming credit for a work generated by an autonomously creative, artificially intelligent computer program” should defeat the human’s claim for I.P. protection.

²¹ See, e.g., Tomasz Klucznik, et al., *Efficient Syntheses of Diverse, Medicinally Relevant Targets Planned by Computer and Executed in the Laboratory*, 4 CHEM. 522, 522 (2018); Matthew H. Todd, *Computer-Aided Organic Synthesis*, 34 CHEM. SOC’Y REV. 247 (2005).

The articles' other prediction about AI was that there was no immediate need to decide if an AI should be considered a constitutional person as the technology had not achieved enough in the 1990s for this to be a legitimate question.²² My re-evaluation here, even after twenty plus years, is that this remains true. Clearly, AI technology today has more capability than it had in 1997, but it does not approach human-level abilities.²³ Whether it will soon achieve consciousness or other indicators of becoming an independent and autonomous being remains just as doubtful today as it was in 1997. After all, to achieve self-awareness in a computer, we need to understand what consciousness is and what causes it, something that remains far beyond the understanding of current science.²⁴

III. PREDICTIONS THAT WERE MORE PROBLEMATIC

There are two areas where my earlier articles may be criticized as not being precise in their predictions. First, the articles focused primarily on AI's consequences on

²² Clifford, *Creative Programs*, *supra* note 4, at 1703; *cf.* Clifford, *Copyright Creativity*, *supra* note 5, at 294–95.

²³ *Cf.* Associated Press, *Self-driving SUV in Fatal Arizona Crash Saw Pedestrian but Didn't Brake, Board Says*, BOSTON GLOBE (May 24, 2018), <https://www.bostonglobe.com/business/2018/05/24/self-driving-suv-fatal-arizona-crash-saw-pedestrian-but-didn-brake-board-says/ZsmJzo9PatEwsbEjk5nHFJ/story.html>.

²⁴ See Christof Koch, *What Is Consciousness?*, SCI. AMER., June 2018, at 61. Indeed, Dr. Koch predicts that the scientific effort to understand consciousness will take “decades.” *Id.* at 64. My estimate would be much longer (if ever). When I was a student of computer science in the 1970s, I was told that human-like artificially intelligent computers would exist within fifty years, a period that is now expiring without the technology being produced. While the overall “competence” of artificially intelligent algorithms has grown significantly since the 1970s, programming an AI that can even mimic human mental abilities seems only a little closer today than it was then.

copyright rather than patent law.²⁵ It seems now, partially because of the advantage of hindsight, that AI's impact on patent law will be the more profound of the two. Second, the articles focused exclusively on the qualification question: was there sufficient human-based creativity in the work developed by an AI to claim IP protection?²⁶ They did not address any other consequences that the ubiquitous use of the technology would cause.²⁷ Innovation is relevant in areas other than under section 101 of the Patent Act²⁸ or section 102 of the Copyright Act,²⁹ and AI's impact must be weighed there too. Each of these is considered in the following sections.

A. *The Use of AI to Create Patentable Inventions is Likely to be More Common than its Use to Create Copyrightable Expressions*

Patent law is likely to face a greater impact from the use of AI technology than copyright law because of the differing motivations that trigger people to create works that are protected by the two systems. While both patent and copyright law are designed to provide economic incentives for the innovator to create and disclose, patent law is more directly connected to commercial exploitation than

²⁵ Compare Clifford, *Creative Programs*, *supra* note 4, at 1681–95, with Christof Koch, *What is Consciousness?*, *supra* note 24, at 1695–97. The second article was exclusively about copyright law and did not address the standards for patent law at all. See Clifford, *Copyright Creativity*, *supra* note 5.

²⁶ See Clifford, *Copyright Creativity*, *supra* note 5, at 260–62; Clifford, *Creative Programs*, *supra* note 4, at 1676–77.

²⁷ See Clifford, *Copyright Creativity*, *supra* note 5, at 260–62; Clifford, *Creative Programs*, *supra* note 4, at 1676–77.

²⁸ 35 U.S.C. § 101 (2012).

²⁹ 17 U.S.C. § 102(a) (2012).

copyright law is.³⁰ A few examples will demonstrate this. First, consider poetry. Many authors produce poetry, but few expect the poetry, even with the copyright system in place, to result in an appreciable financial reward.³¹ Second, music too is often created for the artistic pleasure of creation and self-expression rather than an expectation of financial reward.³² Finally, even the core area of copyright authorship—prose writing—is not immune from this as many authors produce works with little or no hope of a financial return.³³ I would be writing this essay regardless of the existence of the copyright system, and do not expect any economic return to be provided to me because of it.

When the patent system is examined, on the other hand, the motivations of a typical inventor are strikingly different. While the emotional satisfaction received from having created a patentable invention is not lacking, it is unlikely that a modern, industrial- or college-based research laboratory would seek to create new technology without the

³⁰ Compare World Intellectual Property Organization, *Frequently Asked Questions: Patents*, WORLD INTELLECTUAL PROPERTY ORGANIZATION, http://www.wipo.int/patents/en/faq_patents.html (“A patent system intends to correct such under-provision of innovative activities by providing innovators with limited exclusive rights, thereby giving the innovators the possibility to receive appropriate returns on their innovative activities.”), with World Intellectual Property Organization, *Frequently Asked Questions: Copyright*, WORLD INTELLECTUAL PROPERTY ORGANIZATION, http://www.wipo.int/copyright/en/faq_copyright.html (discussing economic and moral rights).

³¹ See Jeremy Spencer, *A Harsh Truth About Poetry Publishing*, REAL PANTS (Jan. 28, 2015), <https://realpants.com/harsh-truth-poetry-publishing/>.

³² See PAUL RUTTER, *THE MUSIC INDUS. HANDBOOK* ch. 2 (2d ed. 2016).

³³ James Fray, *What Type of Financial Return Can I Expect on my Book Publishing Investment*, MONKEYSEE (June 16, 2009), <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjR2NGH957bAhVFmlkKHYhWBHQFggnMAA&url=http%3A%2F%2Fmonkeysee.com%2Fwhat-type-of-financial-return-can-i-expect-on-my-book-publishing-investment%2F&usg=AOvVaw3gNvmZbg6x-hAKYSUZM9GQ>.

patent system in place to capture the initial financial reward from the invention.³⁴ It is probable that, without the financial return provided by the patent system, the multimillion to multibillion dollar investment³⁵ in a research project would not occur and the invention would not be made.³⁶

The increased financial focus of the inventor over that of the writer has consequences. With the greater

³⁴ Most research today—as has probably been true for at least the last hundred years—does not occur in the garage of a single inventor; instead, it involves teamwork combined with a significant financial investment. See Sara Koch, *The Myth of Isolation*, THE CASE FOUNDATION (Nov. 24, 2015), <https://casefoundation.org/blog/the-myth-of-isolation/>.

³⁵ Precise figures for how much it costs to develop a new product are not available. See Aaron E. Carroll, *\$2.6 Billion to Develop a Drug? New Estimate Makes Questionable Assumptions*, N.Y. TIMES (Nov. 18, 2014), <https://www.nytimes.com/2014/11/19/upshot/calculating-the-real-costs-of-developing-a-new-drug.html>. As Mr. Carroll reports, the estimates for the cost of each new drug runs from \$2.6 billion down to \$161 million. Even if the low estimate is accepted, this significant of an investment could not be made if compensation were unavailable. Development costs in other industries is likely less than in the drug industry but is still significant. It is estimated, for example, that Apple spent more than \$150 million to develop the iPhone. See Fred Vogelstein, *And Then Steve Said, 'Let There Be an iPhone'*, N.Y. TIMES (Oct. 4, 2013), <https://www.nytimes.com/2013/10/06/magazine/and-then-steve-said-let-there-be-an-iphone.html?pagewanted=all&auth=login-email>.

³⁶ Of course, I am not arguing that all inventions that are subject to the patent act are done primarily because of the financial award that may be available, only that most are. Indeed, the immediate release of the World Wide Web technology into the public domain by its inventor, would make such a broad argument fail. See *The Man Who Would Have Been a Trillionaire*, 7 FIGURE BLOG (July 29, 2012), <http://yourlifesolution.com/7/the-man-who-would-have-been-a-trillionaire/>. At the same time, though, the extraordinary decision made by Sir Berners-Lee to disclaim any intellectual property claim to the most profound technology of the last thirty years is notable because he walked away from hundreds of billions of dollars. His selflessness is notable because it is rare.

investment needed and risk associated with producing a new invention, a correspondingly higher financial incentive develops to use any technology that is available—including creativity-providing technology—to try to avoid failure. In other words, the natural effect of a profit-motive focus is to seek the most direct path to a financial reward, even if the human involved surrenders his or her own creative desires.³⁷ In summary, from a motive perspective, using AI to invent is directly incentivized while using it to write affirmatively interferes.

In hindsight, therefore, I wish that the articles had spent more time addressing patent law. AI's use in inventing is the more important issue to be evaluated.

Unfortunately, unlike the Copyright Office, the Patent and Trademark Office does not seem to be sensitive to this problem. As described in the MANUAL OF PATENT EXAMINING PROCEDURE (MPEP), the “inventor” is required to “contribute to the conception of the invention,” but there is no examination as to whether the sole source of the conception was computer-based.³⁸ Indeed, the MPEP seems to authorize patent claims by the human “so long as [the human] maintains intellectual domination of the work of making the invention.”³⁹ With current technology, how can the human not “intellectual[ly] dominat[e]” the work as the human still controls the on-off button? The PTO's failure to exclude computer-conceived “inventions” after several

³⁷ See Ben Hattenbach & Joshua Glucoft, *Patents in an Era of Infinite Monkeys and Artificial Intelligence*, 19 STAN. TECH. L. REV. 32, 35 (2015) (“computers are already independently designing genuinely useful inventions in a number of fields.”).

³⁸ See MPEP § 2137.01 (9th ed. Rev. 8, Jan. 2018).

³⁹ *Id.* at § 2137.01(III). The legal authority cited by the PTO is *Morse v. Porter*, 155 U.S.P.Q. (BNA) 280 (B.P.A.I. 1965). The date of the decision alone suggests that its concern was collaboration among a team of human inventors rather than using computer-generated conceptions.

decades is worrisome as it is likely to be yet another cause of decreasing patent quality.⁴⁰

B. The Prevalence of AI Requires Patent Obviousness to be Reconsidered

The other area where the articles were somewhat shortsighted was the failure to appreciate the consequences of AI on other areas of patent law beyond the initial qualification for patent under Section 101.⁴¹ In particular, AI is likely to have a significant effect on obviousness jurisprudence⁴² and the definition of prior art.⁴³ Each will be discussed in turn.

1. Obviousness

As the use of AI becomes omnipresent in the invention process, this will change the evaluation of obviousness under § 103. As the classic test requires,

the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this

⁴⁰ See Ralph D. Clifford, *Is it Time for a Rule 11 for the Patent Bar?*, 53 IDEA 351 (2013); Ralph D. Clifford et al., *A Statistical Analysis of the Patent Bar: Where Are the Software-Savvy Patent Attorneys?*, 11 N.C. J.L. & TECH. 223 (2010).

⁴¹ 35 U.S.C. § 101 (2012).

⁴² *Id.* at § 103. I first began thinking about this connection when I received an e-mail newsletter from Greg Aharonian of the Internet Patent News Service. E-mail from Internet Patent News Service to author (Apr. 5, 2018 10:25 EDT) (“Is human use of these increasingly powerful AI tools something that is an obvious capability of a PHOSITA?”) (on file with author).

⁴³ This is under both the novelty bars under 35 U.S.C. § 102 (2012) and the use of prior art in MPEP § 103 (9th ed. Rev. 8, Jan. 2018), <https://www.uspto.gov/web/offices/pac/mpep/index.html>.

background, the obviousness or nonobviousness of the subject matter is determined.⁴⁴

As it becomes routine to use AI as part of the invention process, the determination of what constitutes “ordinary skill in the pertinent art”⁴⁵ changes. To see this, assume that using AI is a normal part of the average technologist’s repertoire.⁴⁶ The law then would assume that it would be used by the PHOSITA to test out the difficulty of producing the new technology claimed in a patent from the technology that existed upon filing.⁴⁷ If this, in turn, would lead the AI to “re-invent” the claimed technology, the AI-assisted PHOSITA has now been able to produce the invention only using ordinary skills.⁴⁸ By becoming common place, AI has the power to render inventions predictable and obvious.

This is further reinforced because of the “teaching, suggestion, or motivation” (“TSM”) test.⁴⁹ As the Supreme Court explained,

⁴⁴ *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17 (1966).

⁴⁵ *Id.* The classic label of this hypothetical individual is a PHOSITA, a person having ordinary skills in the art. *E.g.*, *Elbit Sys. of Am., LLC v. Thales Visionix, Inc.*, 881 F.3d 1354, 1356 (Fed. Cir. 2018).

⁴⁶ Its use is common today but may not have reached the level described in this hypothetical. *See* Edwards, *supra* note 14, at 13; Kwon, *supra* note 15, at 26; Pogue, *supra* note 15, at 23; Dickson, *supra* note 15, at 93; Iprova, *supra* note 14; Clifford, *Copyright Creativity*, *supra* note 4, at 260 n.5; Press Release, *supra* note 16.

⁴⁷ *Elbit Sys. of Am., LLC*, 881 F.3d at 1357.

⁴⁸ The presumption here is that the PHOSITA would have an AI network available which has already been trained in the relevant domain. The limitations caused by the training, already being studied because of the implications on the results generated by the AI, would also be important to further considerations of obviousness being raised by this essay. *See* Edwards, *supra* note 15.

⁴⁹ *See, e.g.*, *Application of Bergel*, 292 F.2d 955, 956-57 (C.C.P.A. 1961) (establishing what becomes the TSM test).

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.⁵⁰

As an AI is used, it develops a training domain that can grow in unpredictable ways.⁵¹ Even where the human users of the AI initially choose the information to start the AI's knowledge base, use of the AI changes the domain.⁵² In effect, an AI will naturally apply the technology it knows about from one field to answer other questions arising in another. In other words, it would "recognize that it would improve [the new] device[] in the same way [as the old]."⁵³ Even with the Supreme Court's reminder that a flexible use of the TSM test is needed,⁵⁴ AI now renders the new combinations obvious,⁵⁵ a fate that may be shared by all other inventions that can be made by AI.

2. The Prior Art

As well as changing the determination by a PHOSITA that an invention is obvious, AI may have

⁵⁰ *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

⁵¹ *See* Edwards, *supra* note 15.

⁵² *See* Kwon, *supra* note 15.

⁵³ *KSR Int'l Co.*, 550 U.S. at 417.

⁵⁴ *See id.* at 419.

⁵⁵ *Cf. InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1351–53 (Fed. Cir. 2014) (requiring "a reason or motivation" for combining existing technology). Now, of course, that reason is provided by the AI itself.

consequences as to what is considered to be prior art.⁵⁶ Again, a hypothetical will demonstrate the problem. Suppose someone establishes a web site that allows anyone to pose a proposed new invention to an AI. The AI has been programmed to conceive of as many ways as it can to practice each new invention. When found, the solutions are immediately stored in a searchable, online database.

Under this hypothetical, the online database would seem to be a “printed publication.”⁵⁷ By allowing access to anyone on the Internet, the database is “accessible to the public interested in the art.”⁵⁸ Whether a database available on the World Wide Web is “printed” is a new issue, but would seem to have the permanence and availability that is the essence of what is considered to be printed.⁵⁹

Having been described in a printed publication, 35 U.S.C. § 102(a)(1) (2012) establishes that the AI-produced inventions thereafter anticipate identical patent claims and serve as part of the prior art for all others.⁶⁰ Now, with the exactitude needed for anticipation, the database is unlikely to bar all or most claims on that ground, but prior art references need not describe the precise four-corners of claimed invention.⁶¹ All that is needed is that a PHOSITA,

⁵⁶ See generally 3 R. CARL MOY, MOY’S WALKER ON PATENTS § 9:17 (4th ed. Supp. 2017).

⁵⁷ 35 U.S.C. § 102(a)(1) (2012).

⁵⁸ *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1568 (Fed. Cir. 1988).

⁵⁹ See *Hangzhou Chic Intelligent Tech. Co. v. Razor USA LLC*, No. 2:16-CV-06359-RGK (AJWx), 2016 WL 10518582, at *3 (C.D. Cal. Dec. 19, 2016) (finding that a Kickstarter listing is a printed publication). See generally Gerald Rose, *Do You Have a “Printed Publication?” If Not, Do You Have Evidence of Prior “Knowledge or Use?”*, J. PAT. OFF. SOC’Y 643 (1979) (describing the difficulty of determining if something is a printed publication).

⁶⁰ See *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 715–16 (Fed. Cir. 1984).

⁶¹ See *id.* at 716.

having the database, would find the claimed invention obvious.

To pose the ultimate question, assume that no one had presented a claimed invention to the AI before the patent application was filed. With this change, there is no printed publication, so that source of the existing prior art is not available. At the same time, all the PHOSITA has to do to make the AI derive the claim, however, is to ask. In other words, the existence of the AI makes it possible that any PHOSITA can derive any claim by using the ordinary skills associated with using an AI to invent. The implication of this is that any claimed invention—indeed, potentially all claimed inventions—will be obvious.

IV. CONCLUSION

This essay suggests that the development and use of artificial intelligence to make inventions raise some significant issues involving patent prior art that is worthy of additional study.⁶² While I do not believe we have reached the time today where it is obligatory, ultimately, we may need to ask an uncomfortable question: if AI can be more innovative than humans, do we still need the patent system?

⁶² It should be noted that Liza Vertinsky and William Samore have begun this work on the legal side. See Liza Vertinsky, *Thinking Machines and Patent Law in RESEARCH HANDBOOK OF ARTIFICIAL INTELLIGENCE* 15-16 (Forthcoming 2018); Liza Vertinsky, *Boundary-Spanning Collaboration and the Limits of Joint Inventorship Doctrine*, 55 HOUS. L. REV. 401, 432–33 (2017); William Samore, *Artificial Intelligence and the Patent System: Can a New Tool Render a Once Patentable Idea Obvious?*, 29 SYRACUSE J. SCI. & TECH. L. REP. 113 (2013). Similarly, the exploration of what AI technology can achieve continues within the computer science discipline. See Edwards, *supra* note 15; Kwon, *supra* note 15.