

EX MACHINA: COPYRIGHT PROTECTION FOR COMPUTER-GENERATED WORKS

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Abstract

A professor in France claims to have written a million books using his computer software platform. Many of the sports and financial news stories available on the Internet are written by computers. Computers also draw, paint, and compose music. Is their output copyrightable? Copyright law requires an identifiable human author because authors own copyrights and computers do not possess the personhood necessary to own property. The Copyright Office and some courts and commentators go further, requiring for copyright not only an identifiable human author, but also human authorship of the protected work. They demand, in other words, that the copyrightable expression in a work emanate from a human being. If a person uses a computer to assist in the manipulation of expression created by the user, the result is copyrightable. If a user's interaction with a computer prompts it to generate its own expression, the result is excluded from copyright. This is a tenuous and ultimately counter-productive distinction. It denies the incentive of copyright to an increasingly large group of works that are indistinguishable in substance and value from works created by human beings. The copyright statute does not define "author" and the constitutional interpretation of that concept is sufficiently broad to include a human being who instigates the creation of a work. A computer user who initiates the creation of computer-generated expression should be recognized as the author and copyright owner of the resulting work. A number of foreign countries have already taken this step. The United States should join them.

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I. ARTIFICIAL INTELLIGENCE

Philip Parker claims to have written a million books.¹ It may be true. Amazon.com lists over 100,000 titles under his name,² and many more are available as print-on-demand or e-books.³ Parker is a professor of marketing at a business school in France,⁴ and the majority of his books deal with commodities markets,⁵ medicine,⁶ and lexicography.⁷ Parker has developed a series of computer algorithms that can compile publicly available data on a specified subject and, assisted by dozens of computers and several programmers, transform the results into narrative text.⁸ Since his best-sellers typically achieve only a few hundred sales,⁹ Parker is apparently unconcerned with maximizing the legal protection for his books in the United States.¹⁰ It is just as well. United States copyright law is woefully, almost willfully,

1. Bianca Bosker, *Philip Parker's Trick for Authoring Over 1 Million Books: Don't Write*, HUFFINGTON POST (Feb. 11, 2013, 08:59 AM), http://www.huffingtonpost.com/2013/02/11/philip-parker-books_n_2648820.html.

2. See AMAZON, <http://www.amazon.com> (search for "Philip M. Parker").

3. Noam Cohen, *He Wrote 200,000 Books (but Computers Did Some of the Work)*, N.Y. TIMES (Apr. 14, 2008), <http://www.nytimes.com/2008/04/14/business/media/14link.html>.

4. Professor Parker is the INSEAD Chaired Professor of Management Science at INSEAD. *Philip M. Parker*, INSEAD, <http://www.insead.edu/faculty-research/faculty/philip-m-parker> (last visited Nov. 1, 2016).

5. See generally PHILIP M. PARKER, *THE 2007 IMPORT AND EXPORT MARKET FOR BEANS, PEAS, LENTILS, AND LEGUMES IN ALGERIA* (2006).

6. See generally PHILIP M. PARKER, *EHLERS-DANLOS SYNDROME—A BIBLIOGRAPHY AND DICTIONARY FOR PHYSICIANS, PATIENTS, AND GENOME RESEARCHERS* (2007).

7. See generally PHILIP M. PARKER, *WEBSTER'S HMONG—ENGLISH THESAURUS DICTIONARY* (2008).

8. Cohen, *supra* note 3.

9. *Id.* With his low costs, Parker estimates that even a single sale of a work can produce a profit. *Id.*

10. Neither Parker nor his publisher, ICON, has registered the copyrights in the United States. (Copyright Office search conducted on June 1, 2016). The thirty-five-dollar cost of registration for each work would presumably present a significant deterrent to registration.

unprepared for Professor Parker and his books. Is Parker an “author”? Are his books “writings” under our copyright system despite their technological origins? Our law has not resolved these questions. This article examines the state of copyright law with respect to the protection of works produced in whole or in part by computers. It offers a new perspective better suited to the current and future capabilities of artificial intelligence.

The steep trajectory of artificial intelligence will quickly make Professor Parker’s achievements seem mundane. Only twenty years ago, IBM’s *Deep Blue* computer made international headlines by defeating world chess champion Garry Kasparov.¹¹ In 2011, an IBM computer named *Watson* became the champion of the game show *Jeopardy*,¹² and a computer program called *Libratus*, developed by artificial intelligence researchers at Carnegie Mellon University, is apparently the world’s best poker player.¹³ In 2016, an artificial intelligence system named *AlphaGo*, created by Google, defeated a human champion of Go, the 2500-year-old Chinese strategy game that is much more complex than chess.¹⁴ Computers now make investment decisions for clients,¹⁵ enter into binding contracts,¹⁶ drive cars,¹⁷ and

11. Bruce Weber, *Swift and Slashing, Computer Topples Kasparov*, N.Y. TIMES (May 12, 1997), <http://www.nytimes.com/1997/05/12/nyregion/swift-and-slashing-computer-topples-kasparov.html>.

12. John Markoff, *Computer Wins on ‘Jeopardy!’: Trivial, It’s Not*, N.Y. TIMES (Feb. 16, 2011), <http://www.nytimes.com/2011/02/17/science/17jeopardy-watson.html>.

13. Jane Wakefield, *AI Program Beats Humans in Poker Game*, BBC (Jan. 31, 2017), www.bbc.com/news/technology-38812530.

14. Andrew McAfee & Erik Brynjolfsson, *Where Computers Defeat Humans, and Where They Can’t*, N.Y. TIMES (Mar. 16, 2016), <http://www.nytimes.com/2016/03/16/opinion/where-computers-defeat-humans-and-where-they-cant.html>.

15. Michelle Fleury, *How Artificial Intelligence is Transforming the Financial Industry*, BBC (Sept. 16, 2015), www.bbc.com/news/business-34264380. “About three-quarters of trades on the New York Stock Exchange and Nasdaq are [now] done by algorithms . . .” Padraig Belton, *Would You Let a Robot Invest Your Hard-Earned Cash?*, BBC (Mar. 18, 2016), <http://www.bbc.com/news/business-35830311>. Researchers at MIT have used artificial intelligence armed with rules from the Internal Revenue Code to identify specific combinations of business transactions that can produce abusive tax shelters. Lynnley Browning, *Computer Scientists Wield Artificial Intelligence to Battle Tax Evasion*, N.Y. TIMES (Oct. 9, 2015), <http://www.nytimes.com/2015/10/10/business/computer-scientists-wield-artificial-intelligence-to-battle-tax-evasion.html>.

16. See UNIF. ELEC. TRANSACTIONS ACT § 14(1) (NAT’L CONFERENCE OF COMM’RS ON UNIF. STATE LAWS 1999) (“A contract may be formed by the interaction of electronic agents of the parties, even if no individual was aware of or reviewed the electronic agents’ actions or the resulting terms and agreements.”).

17. Cecilia King, *Self-Driving Cars Gain Powerful Ally: The Government*, N.Y. TIMES

staff hotels.¹⁸ A computer developed at Stanford University can recognize and label complex images.¹⁹ Artificial intelligence allows Amazon to recommend books and Netflix to suggest movies based on a customer's past selections.²⁰ The progress in artificial intelligence has been made possible by the exponential growth in computer processing power, famously foreseen in 1965 by Intel co-founder Gordon Moore.²¹ His *Moore's Law* predicted that the number of transistors that could be incorporated into an integrated circuit chip would double every year; he revised the estimate to every two years in 1975.²² Although the pace of this amazing progress had begun to slow during the past decade, new developments recently announced by researchers at IBM may give prolonged life to *Moore's Law*.²³ An important application of this increasing processing power has been in the area of "machine learning," defined by the head of Carnegie Mellon University's Machine Learning Department as "a scientific field addressing the question 'How can we program systems to automatically learn and to improve with experience?'"²⁴ Artificial intelligence and machine learning are major fields of research at institutions such as MIT,²⁵ Stanford,²⁶ and

(Sept. 19, 2016), <http://www.nytimes.com/2016/09/20/technology/self-driving-cars-guidelines.html>.

18. See *Henn na Hotel Concept*, HENN NA HOTEL, www.h-n-h.jp/en/concept (last visited Nov. 1, 2016).

19. Jane Wakefield, *The Search for a Thinking Machine*, BBC (Sept. 17, 2015), [hereinafter Wakefield, *The Search*] www.bbc.com/news/technology-32334573.

20. *Id.*

21. See *Moore's Law*, ENCYCLOPÆDIA BRITANNICA, <https://www.britannica.com/topic/Moores-law> (last updated Nov. 17, 2015).

22. *Id.*

23. See John Markoff, *IBM Scientists Find New Way to Shrink Transistors*, N.Y. TIMES (Oct. 1, 2015), <http://www.nytimes.com/2015/10/02/science/ibm-scientists-find-new-way-to-shrink-transistors.html>. With chipmakers nearing the point at which they are manipulating matter as small as atoms, it is likely that within a few years they will reach the physical limit on how small semiconductors can become. John Markoff, *Moore's Law Running Out of Room, Tech Looks for a Successor*, N.Y. TIMES (May 4, 2016), <http://www.nytimes.com/2016/05/05/technology/moores-law-running-out-of-room-tech-looks-for-a-successor.html>. However, scientists are already developing new methods of computing, including quantum computers that replace classical digital computing with processing that relies on the quantum-mechanical properties of energy and matter. John Markoff, *IBM Wants Everyone to Try a Quantum Computer*, N.Y. TIMES (May 4, 2016), http://www.nytimes.com/2016/05/04/technology/ibm-wants-everyone-to-try-a-quantum-computer.html?_r=0.

24. *Machine Learning Department*, CARNEGIE MELLON U., <http://www.ml.cmu.edu/> (last visited Nov. 1, 2016).

25. The Computer Science and Artificial Intelligence Laboratory is the largest laboratory at MIT. *About CSAIL*, CSAIL, <http://www.csail.mit.edu/about> (last visited Nov. 1, 2016).

Caltech.²⁷ In 2014, Google paid about half-a- billion dollars to acquire DeepMind Technologies, a London-based machine learning start-up co-founded by Demis Hassabis, who now leads Google's machine learning initiative.²⁸ A particularly portentous approach to machine learning makes use of artificial neural networks that attempt to mimic the structure and workings of biological neural networks like the human brain.²⁹ Stanford Professor Fei-Fei Li, for example, has employed neural network algorithms to enhance the ability of a computer to recognize images.³⁰

The capacity of computer systems to improve their performance based on experience creates dramatic possibilities. A study from Oxford University suggests that 47% of total United States employment could be at risk to smart software or robots in the next two decades,³¹ and

26. Stanford's Computer Science Department includes the Stanford Artificial Intelligence Laboratory. See *Stanford Engineering*, STAN. U., <http://www-cs.stanford.edu/research/ai> (last visited Nov. 1, 2016).

27. Machine learning is a "core area" in the Department of Computing and Mathematical Sciences. *Statistics & Machine Learning*, CAL. INST. TECH., www.cms.caltech.edu/research/machine_learning (last visited Nov. 1, 2016).

28. Kamal Ahmed, *Google's Demis Hassabis—Misuse of Artificial Intelligence 'Could Do Harm'*, BBC (Sept. 16, 2015), www.bbc.com/news/business-34266425. Hassabis lists Cambridge University, Oxford University, University College London, and Imperial College London as institutions with strong machine learning departments in the United Kingdom. *Id.* It was Google's DeepMind subsidiary that developed the *AlphaGo* artificial intelligence system that defeated a human champion of Go. See McAfee & Brynjolfsson, *supra* note 14. Go has too many possible moves to analyze every possibility. Instead, *AlphaGo* "learned" the game by analyzing 100,000 Go matches available online and honed its skill with millions of simulated matches played against itself. Choe Sang-Hun & John Markoff, *Master of Go Board Game is Walloped by Google Computer Program*, N.Y. TIMES (Mar. 9, 2016), <http://www.nytimes.com/2016/03/10/world/asia/google-alphago-lee-sedol.html>. Facebook, too, is heavily invested in artificial intelligence research. Jane Wakefield, *Intelligent Machines: What Does Facebook Want with AI?*, BBC (Sept. 15, 2015), www.bbc.com/news/technology-34118481.

29. See, Wakefield, *The Search*, *supra* note 19.

30. *Id.* Neural network technology was deployed with dramatic success to improve the functioning of Google Translate. Gideon Lewis-Krause, *The Great A.I. Awakening*, N.Y. TIMES MAGAZINE (Dec. 14, 2016), <http://www.nytimes.com/2016/12/14/magazine/the-great-ai-awakening.html?rref=collection%2Fsectioncollection%2Fmagazine&action=click&contentCollection=magazine®ion=rank&module=package&version=highlights&contentPlacement=1&pgtype=sectionfront>.

31. CARL B. FREY & MICHAEL A. OSBORNE, *THE FUTURE OF EMPLOYMENT: HOW SUSCEPTIBLE ARE JOBS TO COMPUTERISATION?* 38 (2013), http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf. The concern may be overblown. Steve Lohr, *Robots Will Take Jobs, But Not as Fast as Some Fear*, *New Report Says*, N.Y. TIMES (Jan. 12, 2017), <https://www.nytimes.com/2017/01/12/technology/robots-will-take-jobs-but-not-as-fast-as-some-fear-new-report-says.html>.

45% of the 800 corporate executives surveyed said that they expected an artificial intelligence machine to be on their board of directors by 2025.³² In a survey of managing partners at 320 U.S. law firms, 35% said they could envision first-year associates being replaced by artificial intelligence in the next five to ten years.³³ Combined results from surveys of artificial intelligence experts estimate a 50% chance of human-level machine intelligence by 2040 and a 90% probability by 2075.³⁴ The full potential of artificial intelligence may be best illustrated by the concern it has provoked.³⁵ Artificial intelligence has already been weaponized in the form of autonomous drones and combat robots.³⁶ Several prominent observers see a more existential threat.³⁷ In an interview with the BBC, renowned theoretical physicist Stephen Hawking said, "The development of full artificial intelligence could spell the end of the human race."³⁸ Elon Musk, founder of Tesla Motors and SpaceX, has called artificial intelligence "our biggest existential threat,"³⁹ likening it to "summoning the demon."⁴⁰ Microsoft founder

32. Lucy Marcus, *Is This a Truly Robot-Proof Job?*, BBC: CAPITAL (Sept. 22, 2015), <http://www.bbc.com/capital/story/20150921-is-this-a-truly-robot-proof-job>; see also Matthew Wall, *Could a Big-Data Crunching Machine Be Your Boss One Day?*, BBC (Oct. 9, 2014), www.bbc.com/news/business-29456257.

33. Debra Weiss, *Will Newbie Associates Be Replaced by Watson? 35% of Law Firm Leaders Can Envision It*, ABA J. (Oct. 26, 2015, 07:42 AM), http://www.abajournal.com/news/article/will_associates_be_replaced_by_watson_computing_35_percent_of_law_firm_lead/?utm_source=maestro&utm_medium=email&utm_campaign=tech_monthly. A new software "robot lawyer" created by a Stanford University student has successfully challenged 250,000 traffic tickets and is now helping asylum seekers file immigration applications. Megha Mohan, *The "Robot Lawyer" Giving Free Legal Advice to Refugees*, BBC (Mar. 9, 2017), <http://www.bbc.com/news/blogs-trending-39205935>.

34. NICK BOSTROM, *SUPERINTELLIGENCE: PATHS, DANGERS, AND STRATEGIES* 23 (2014). The author is the Director of Oxford University's Future of Humanity Institute. NICK BOSTROM'S HOME PAGE, <http://www.nickbostrom.com/> (last visited Nov. 1, 2016).

35. See Jane Wakefield, *Intelligent Machines: Do We Really Need to Fear AI?*, BBC (Sept. 28, 2015), www.bbc.com/news/technology-32334568.

36. *Id.* The border separating North and South Korea is already guarded by robot sentries, but, at least for now, they still require human permission to shoot. *Id.* The issue of autonomous weapons has been raised under the Convention on Certain Conventional Weapons. See *Background - Lethal Autonomous Weapons Systems*, UNOG, www.unog.ch/80256EE600585943/%28httpPages%29/8FA3C2562A60FF81C1257CE600393DF6?OpenDocument (last visited Sept. 29, 2016).

37. See Rory Cellan-Jones, *Stephen Hawking Warns Artificial Intelligence Could End Mankind*, BBC (Dec. 2, 2014), <http://www.bbc.com/news/technology-30290540>.

38. *Id.* Explaining his concern, Hawking said, "It would take off on its own, and redesign itself at an ever increasing rate . . . Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded." *Id.*

39. *Id.*

40. David Shukman, *How Safe Can Artificial Intelligence Be?*, BBC (Sept. 15, 2015),

Bill Gates agrees.⁴¹

Whatever the future holds, artificial intelligence is already an active participant in the creative process. Professor Parker and his million books are far from the only literary works created by computer software. Artificial intelligence is increasingly prominent in journalism. An algorithm called *Quakebot*, produced by a journalist at the *Los Angeles Times*, uses a pre-written template to produce news stories based on information extracted from alerts released by the U.S. Geological Survey.⁴² *Quakebot*'s stories are primitive, however, compared with the output of software created by companies like Narrative Science and Automated Insights. According to Stuart Frankel, co-founder of Chicago-based Narrative Science, "[o]ne of the powerful aspects of our technology is that it is not template-driven. Each report is built from the ground up."⁴³ Narrative Science's patented *Quill* software produces news stories and reports through a process the

www.bbc.com/news/science-environment-34249500. Musk and other entrepreneurs have pledged \$1 billion to a new research center devoted to "developing A.I. in a way that is safe," with the long-term goal of creating artificial intelligence "capable of performing any intellectual task that a human being can" accomplish. John Markoff, *Artificial-Intelligence Research Center is Founded by Silicon Valley Investors*, N.Y. TIMES (Dec. 11, 2015), <http://www.nytimes.com/2015/12/12/science/artificial-intelligence-research-center-is-founded-by-silicon-valley-investors.html>.

41. Dion Dassanayake, *Bill Gates Joins Stephen Hawking in Warning Artificial Intelligence IS a Threat to Mankind*, EXPRESS (Jan. 29, 2015, 10:09 PM), <http://www.express.co.uk/news/world/555092/Bill-Gates-Stephen-Hawking-Artificial-Intelligence-AI-threat-mankind>. Gates is quoted as stating, "I agree with Elon Musk and some others on this and don't understand why some people are not concerned." *Id.* Google's DeepMind artificial intelligence division is engaged in research to develop a "kill switch" that will prevent artificial intelligence systems from learning to over-ride human input. *Google Developing Kill Switch for AI*, BBC (June 8, 2016), <http://www.bbc.com/news/technology-36472140>.

42. Will Oremus, *The First News Report on the L.A. Earthquake Was Written by a Robot*, SLATE: FUTURE TENSE (Mar. 17, 2014, 5:30 PM), http://www.slate.com/blogs/future_tense/2014/03/17/quakebot_los_angeles_times_robot_journalist_writes_article_on_la_earthquake.html. *Quakebot*'s *Los Angeles Times* news story as quoted in *Slate* states:

A shallow magnitude 4.7 earthquake was reported Monday morning five miles from Westwood, California, according to the U.S. Geological Survey. The temblor occurred at 6:25 a.m. Pacific time at a depth of 5.0 miles. According to the USGS, the epicenter was six miles from Beverly Hills, California, seven miles from Universal City, California, seven miles from Santa Monica, California and 348 miles from Sacramento, California. In the past ten days, there have been no earthquakes magnitude 3.0 and greater centered nearby.

Id.

43. Tom Groenfeldt, *Lots of Data, One Analyst, Many Reports -- Narrative Science*, FORBES (Sept. 5, 2013, 09:20 AM), <http://www.forbes.com/sites/tomgroenfeldt/2013/09/05/lots-of-data-one-analyst-many-reports-narrative-science/>.

company describes as “narrative analytics.”⁴⁴ The *Quill* software platform analyzes data, identifies relevant facts, and uses natural language generation to assemble a narrative that is “indistinguishable from a human-written one.”⁴⁵ Customers can even choose a stylistic tone for their stories.⁴⁶ The Big Ten Conference Network has been a client since 2010.⁴⁷ Narrative Science produced this news story at the conclusion of a 2011 football game involving Big Ten member Wisconsin:

Wisconsin jumped out to an early lead and never looked back in a 51-17 win over UNLV on Thursday at Camp Randall Stadium. The Badgers scored 20 points in the first quarter on a Russell Wilson touchdown pass, a Montee Ball touchdown run and a James White touchdown run. Wisconsin’s offense dominated the Rebels’ defense. The Badgers racked up 499 total yards in the game including 258 yards passing and 251 yards on the ground. Ball ran for 63 yards and three touchdowns for the Badgers. He also caught two passes for 67 yards and a touchdown. Wilson completed 10-of-13 passes for 255 for Wisconsin. He threw two touchdowns and no interceptions. Caleb Herring threw for 146 yards on 18-of-27 passing. Herring tossed two touchdowns and no interceptions. UNLV had 292 total yards. In addition to Herring’s efforts through the air, the running game also contributed 146 yards for the Rebels.⁴⁸

Narrative Science also produces corporate earnings reports for *Forbes*, including this report on Skullcandy, a Utah company that markets audio equipment:

44. See generally NARRATIVE SCI., NARRATIVE ANALYTICS: FROM DATA, TO INSIGHT, TO ACTION, <http://resources.narrativescience.com/i/527235-narrative-analytics-white-paper/>.

45. *Quill*, NARRATIVE SCI., <https://www.narrativescience.com/quill> (last visited Nov. 1, 2016).

46. According to one financial analyst, “You can get anything, from something that sounds like a breathless financial reporter screaming from a trading floor to a dry sell-side researcher pedantically walking you through it.” Steven Levy, *Can an Algorithm Write a Better News Story than a Human Reporter?*, WIRED (Apr. 24, 2012, 4:46 PM), <http://www.wired.com/2012/04/can-an-algorithm-write-a-better-news-story-than-a-human-reporter/>.

47. Steve Lohr, *In Case You Wondered, a Real Human Wrote This Column*, N.Y. TIMES (Sept. 10, 2011), <http://www.nytimes.com/2011/09/11/business/computer-generated-articles-are-gaining-traction.html>.

48. BTN.com Staff, *Badgers Blow Away UNLV, 51-17*, BIG TEN NETWORK, <http://btn.com/2011/09/01/wisconsin-blows-away-unlv-51-17/> (last visited Nov. 1, 2016).

Skullcandy reports its second-quarter earnings on Thursday, July 31, 2014, and the consensus earnings per share estimate is one cent per share. Despite not changing over the past month, the consensus estimate is down from three months ago when it was three cents. For the fiscal year, analysts are projecting earnings of 19 cents per share. Revenue is projected to be 6% above the year-earlier total of \$50.8 million at \$53.9 million for the quarter. For the year, revenue is projected to roll in at \$225.4 million.

Skullcandy's loss in the most recent quarter came after two previous quarters of profitability. Skullcandy is an audio brand that reflects the collision of the music, fashion and action sports lifestyles. Koss, also in the audio and video equipment industry, will report earnings on Wednesday, August 6, 2014. Other companies in the audio and video equipment industry with upcoming earnings release dates include: LRAD, Harman International and Universal Electronics.⁴⁹

Narrative Science co-founder Kristian Hammond predicts that in fifteen years ninety percent of news stories will be written by computers and that a Pulitzer Prize for a computer may not be far off.⁵⁰

Narrative Science's chief rival is Automated Insights and its *Wordsmith* software. Located in North Carolina, it too offers clients customized reports created through data analysis and natural language generation.⁵¹ Automated Insights produces millions of financial and sports stories each year for companies like AP and Yahoo and generates business reports and other materials for clients such as Samsung, Comcast, and Allstate.⁵² CEO and founder Robbie Allen has said that Automated Insights would produce over one *billion* stories in 2014.⁵³ Like *Quill*, *Wordsmith* can vary the tone of its stories and generates

49. Narrative Science, *Forbes Earnings Preview: Skullcandy*, FORBES (July 30, 2014, 10:00 AM), <http://www.forbes.com/sites/narrativescience/2014/07/30/forbes-earnings-preview-skullcandy/#43a1a8d149c8>.

50. Levy, *supra* note 46.

51. See AUTOMATED INSIGHTS, <https://automatedinsights.com> (last visited Nov. 1, 2016).

52. See *id.*; *Wordsmith*, AUTOMATED INSIGHTS, <https://automatedinsights.com/wordsmith> (last visited Nov. 1, 2016).

53. Sam Kirkland, 'Robot' to Write 1 Billion Stories in 2014 — But Will You Know It When You See It?, POYNTER (Mar. 21, 2014), <http://www.poynter.org/news/media-innovation/244113/robot-to-write-1-million-stories-in-2014-but-will-you-know-it-when-you-see-it/>.

output ranging from long narratives to headlines and tweets.⁵⁴ It produced this story about a college basketball game for AP:

Marcus Paige scored with nine seconds remaining in the game to give North Carolina a 72-71 lead over Louisville. The Heels held on to win by that same score following a missed 3-pointer by Wayne Blackshear and an unsuccessful second-chance attempt by Terry Rozier.

The Paige basket capped off a 13-point comeback for the Tar Heels, who trailed 63-50 after a Blackshear 3-pointer with 8:43 left in the game. UNC finished the game on a 22-8 run to secure the victory. After a basket by Brice Johnson gave North Carolina a 70-69 lead with 39 seconds left, Rozier responded with a hoop to give Louisville a one-point advantage with 26 seconds remaining.

The streaky second half followed a back-and-forth first 20 minutes that featured four lead changes and five ties, including at 34 points entering the half.

Kennedy Meeks lead a balanced North Carolina attack with 13 points. . . . The reserves for North Carolina outscored their Louisville counterparts 20-0, with Nate Britt providing eight points off the bench. The Tar Heels also controlled the offensive glass, grabbing 17 offensive rebounds (OR% of 44.7) versus only nine for the Cardinals (OR% of 28.1).

It marked the first league loss of the season for Louisville, which dropped to 14-2 overall and 2-1 in the ACC. With the win, North Carolina climbed into a conference tie with the Cardinals at 2-1, improving to 12-4 in all games.⁵⁵

A blind test comparing reader reactions to a sports story written by Automated Insights and one written by a sports journalist concluded that “[a]lthough the differences are small, the software-generated content can be said to score higher on descriptors typically pertaining to the notion for credibility.”⁵⁶

54. See *Wordsmith*, *supra* note 52.

55. Stephen Beckett, *Robo-Journalism: How a Computer Describes a Sports Match*, BBC (Sept. 12, 2015), <http://www.bbc.com/news/technology-34204052>.

56. Christer Clerwall, *Enter the Robot Journalist*, 8 JOURNALISM PRAC. 519, 525 (2014), <http://www.tandfonline.com/doi/pdf/10.1080/17512786.2014.883116?needAccess=>

Wordsmith also generated this financial news story for AP:

The New York Times Co. (NYT) on Tuesday reported fourth-quarter net income of \$34.9 million.

The New York-based company said it had profit of 22 cents per share. Earnings, adjusted for one-time gains and costs, came to 26 cents per share.

The results exceeded Wall Street expectations. The average estimate of analysts surveyed by Zacks Investment Research was for earnings of 23 cents per share.

The newspaper publisher posted revenue of \$444.7 million in the period, also topping Street forecasts. Analysts expected \$437.2 million, according to Zacks.

For the year, the company reported profit of \$33.3 million, or 20 cents per share. Revenue was reported as \$1.59 billion.

The Times shares have dropped 3.5 percent since the beginning of the year. The stock has declined roughly 10 percent in the last 12 months.⁵⁷

News stories and business reports are not the only literary works generated by computers. A graduate student at MIT used a popular machine-learning application called *SwiftKey*, along with a data set consisting of words used by Shakespeare, to create a poetry-writing algorithm.⁵⁸ It produced this sonnet:

When I in dreams behold thy fairest shade
 Whose shade in dreams doth wake the sleeping morn
 The daytime shadow of my love betray'd
 Lends hideous night to dreaming's faded form
 Were painted frowns to gild mere false rebuff
 Then should'st my heart be patient as the sands

true. The software-generated story discussed in the article is credited to StatSheet, which is the former name of Automated Insights. *See id.* at 530.

57. *The Times Beats Street 4Q Forecasts*, YAHOO! FIN. (Feb. 3, 2015), <http://finance.yahoo.com/news/times-beats-street-4q-forecasts-134853758.html>.

58. Ross Brooks, *Computer Algorithm Generates Poetry as Good as Shakespeare's*, PSFK (Jan. 28, 2014), <http://www.psfk.com/2014/01/shakespeare-machine-learning-poetry-app.html>.

For nature's smile is ornament enough
 When thy gold lips unloose their drooping bands
 As clouds occlude the globe's enshrouded fears
 Which can by no astron'my be assail'd
 Thus, thyne appearance tears in atmospheres
 No fond perceptions nor no gaze unveils
 Disperse the clouds which banish light from thee
 For no tears be true, until we truly see⁵⁹

An undergraduate student at Duke had earlier created poetry-writing software that passed its own mini-version of the Turing Test⁶⁰ by producing a poem that was accepted for publication in a literary journal by editors who did not realize that it had been written by a computer.⁶¹

Visual works are also frequently produced by computers. Geographic information systems that capture, analyze, and present spatial or geographic data in response to search queries are an obvious example.⁶² The maps they produce are important tools in scientific investigations, government planning, and business and industry research.⁶³ Some software can produce visual works of a more "artistic" nature. Professor Harold Cohen of the University of California-San Diego, a pioneer in computer art, has worked on art-producing software

59. *Id.*

60. The Turing Test was proposed in 1950 by British mathematician Alan Turing as a means to decide "whether a computer can 'think.'" *Turing Test*, ENCYCLOPÆDIA BRITANNICA, <http://www.britannica.com/technology/Turing-test> (last updated Mar. 14, 2016). The test is based on an "imitation game" in which a human interrogator has a fixed amount of time to distinguish between a human subject and a computer based on their answers to questions posed by the interrogator. *Id.*

61. Brian Merchant, *The Poem that Passed the Turing Test*, VICE: MOTHERBOARD (Feb. 5, 2015, 11:10 AM), <http://motherboard.vice.com/read/the-poem-that-passed-the-turing-test>. The poem is entitled, *For the Bristlecone Snag*:

A home transformed by the lightning
 the balanced alcoves smother
 this insatiable earth of a planet, Earth.
 They attacked it with mechanical horns
 because they love you, love, in fire and wind.
 You say, what is the time waiting for in its spring?
 I tell you it is waiting for your branch that flows,
 because you are a sweet-smelling diamond architecture
 that does not know why it grows.

Id.

62. See *GIS*, ENCYCLOPÆDIA BRITANNICA, <http://www.britannica.com/technology/GIS> (last updated Feb. 18, 2005).

63. *Id.*

since 1973.⁶⁴ His *AARON* painting machine paints with real paint on canvas and its works have appeared in major museums.⁶⁵ The works are not based on preexisting images.⁶⁶ Instead, the computer is programmed with descriptions and lists of objects and basic rules on the relationships between them.⁶⁷ It paints what it wishes, producing representations of objects and scenes that it has never “seen.”⁶⁸ In 2011, Benjamin Grosser introduced his *Interactive Robotic Painting Machine* that paints with oil on canvas using sounds in its environment to influence the final work.⁶⁹ University of London professor Simon Colton began developing *The Painting Fool* in 2001.⁷⁰ Among other techniques, it can extract keywords from news stories, find relevant images on the Internet, and then assemble its own rendition of the events in a collage.⁷¹ Engineers at Google’s Artificial Intelligence Lab realized that the neural networks they had constructed could create images based on “random-noise” pictures in their datasets.⁷² The resulting works have been described as “nightmarish” and “hallucinatory.”⁷³ In 2010, Patrick Tresset, an artist and Ph.D. student at the University of London, created a drawing robot named *Paul*.⁷⁴ *Paul* and its nineteen similarly-named siblings have been programmed to draw using the same techniques as their human creator.⁷⁵ With its camera and robotic arm, *Paul* creates recognizable drawings of subjects who sit for portraits in

64. Richard Moss, *Creative AI: The Robots that Would Be Painters*, NEW ATLAS (Feb. 16, 2015), <http://newatlas.com/creative-ai-algorithmic-art-painting-fool-aaron/36106/> (containing reproductions of works by *AARON*).

65. *Id.*

66. *Id.*

67. *Id.*

68. *Id.* *AARON* even mixes its own paints. *Id.*

69. *Id.* Programmers working with Microsoft and two Dutch museums have used machine-learning algorithms and data on Rembrandt paintings to create a program that can produce portraits in the style of the Dutch master. Chris Baraniuk, *Computer Paints ‘New Rembrandt’ After Old Works Analysis*, BBC (Apr. 6, 2016), <http://www.bbc.com/news/technology-35977315>. 3-D printers give the works “the same texture as an oil painting.” *Id.*

70. Moss, *supra* note 64.

71. *Id.* (containing reproductions of works by *The Painting Fool*).

72. Jane Wakefield, *Intelligent Machines: AI Art is Taking on the Experts*, BBC (Sept. 18, 2015), <http://www.bbc.com/news/technology-33677271>.

73. *Id.* The works have been compared to visions produced by mind-altering drugs and to the tortured genius of Van Gogh. *Id.* (containing reproductions of two of the works).

74. *Robbotticelli: The Mechanical Marvel Creating Extraordinary Works of Art*, BBC (Sept. 8, 2015), <http://www.bbc.co.uk/programmes/articles/1f4Z6k7Clz6qY6Q2K56nkzZ/robbotticelli-the-mechanical-marvel-creating-extraordinary-works-of-art>.

75. *Id.*

as little as twenty minutes, even autographing the finished work.⁷⁶ Audiovisual works are also already within the capability of contemporary artificial intelligence systems.⁷⁷ Music too is well within the reach of modern computers. A software program called *Iamus*, created by computer scientist Francisco Vico at the University of Malaga in Spain, has produced chamber music that passes the musical version of the Turing Test by fooling veteran musicologists.⁷⁸ The program uses a process similar to natural selection by generating random fragments of music and then mutating them, with each mutation assessed to see if adheres to basic musical rules.⁷⁹ Works by *Iamus* have been performed by major musical groups, including the London Symphony Orchestra.⁸⁰

II. COPYRIGHT AND COMPUTER-RELATED WORKS

The trajectory of modern copyright law has not matched the trajectory of modern computer technology. Remarkably, copyright's initial encounter with computer-related works dates back more than a half-century.⁸¹ In his *Annual Report* for 1965,⁸² Register of Copyrights Abraham Kaminstein reported that applications for copyright registration had been received for a musical composition, an abstract drawing, and several compilations that were "at least partly the 'work' of computers."⁸³ Although he did not reveal the Copyright Office's ultimate disposition of the applications, the Register's view of the underlying issue was clear:

The crucial question appears to be whether the "work" is basically one of human authorship, with the computer merely being an assisting *instrument*, or whether the traditional elements of authorship in the work (literary, artistic, or musical

76. *Id.* (containing numerous examples of *Paul's* work).

77. An artificial intelligence system "directed" the creation of a video entitled *Eclipse* featuring a French pop band, including casting, script-writing, treatment preparation, shooting (done by drones), and editing. Rory Cellan-Jones, 'Cut!' – *The AI Director*, BBC (June 23, 2016), <http://www.bbc.com/news/technology-36608933>.

78. Philip Ball, *Artificial Music: The Computers That Create Melodies*, BBC: FUTURE (Aug. 8, 2014), <http://www.bbc.com/future/story/20140808-music-like-never-heard-before>.

79. *Id.*

80. *Id.* (containing sound recordings of several *Iamus* compositions).

81. See U.S. COPYRIGHT OFFICE, SIXTY-EIGHTH ANNUAL REPORT OF THE REGISTER OF COPYRIGHTS FOR THE FISCAL YEAR ENDING JUNE 30, 1965, at 5 (1966).

82. *Id.*

83. *Id.*

expression or elements of selection, arrangement, etc.) were actually conceived and executed not by man, but by a machine.⁸⁴

The latter, apparently, was beyond the scope of copyright. This emphasis on human creation has remained an unfortunate touchstone. Fifty years later, the *Compendium of U.S. Copyright Office Practices* continues to declare, "The U.S. Copyright Office will register an original work of authorship, provided that the work was created by a human being."⁸⁵ The Copyright Office supports its insistence on human creation with a quotation from the Supreme Court's 1879 *Trade-Mark Cases*,⁸⁶ which spoke of protecting "the fruits of intellectual labor" that "are founded in the creative powers of the mind."⁸⁷ This romanticized vision of authorship may dominate modern copyright law,⁸⁸ but it is a poor bridge to the future.⁸⁹ Nevertheless, many treatise writers⁹⁰ and scholars⁹¹ continue to opine that human creation is a prerequisite to

84. *Id.* (emphasis added).

85. U.S. COPYRIGHT OFFICE, COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICES § 306 (3d ed. 2014) [hereinafter COMPENDIUM], <http://www.copyright.gov/comp3/docs/compendium.pdf>. A subsequent section reiterates: "To qualify as a work of 'authorship' a work must be created by a human being." *Id.* § 313.2.

86. 100 U.S. 82, 94 (1879).

87. *Id.* (emphasis omitted).

88. See, e.g., Peter Jaszi, *On the Author Effect: Contemporary Copyright and Collective Creativity*, 10 CARDOZO ARTS & ENT. L.J. 293, 295 (1992) (describing the common conception of "originality, organic form, and the work of art as the expression of the unique personality of the artist"); Martha Woodmansee, *On the Author Effect: Recovering Collectivity*, 10 CARDOZO ARTS & ENT. L.J. 279, 280 (1992) (recounting the surprisingly recent rise of the romantic vision of a single author generating an original work).

89. Jaszi, *supra* note 88, at 320 ("The ideology of Romantic 'authorship,' however, has greater potential to mislead than to guide the decision-makers who will shape the legal regime for this new and promising communications technology[—the Internet].").

90. 1 PAUL GOLDSTEIN, GOLDSTEIN ON COPYRIGHT § 2.2.2 (3d ed. 2014) ("Cases may arise, nonetheless, that squarely present the question whether copyright can attach to a computer-generated product for which the only human intervention is the hand that turned on the machine. Although the question is close, it would appear that, at least without an express direction from Congress, courts should withhold copyright from these automated products."); 2 WILLIAM F. PATRY, PATRY ON COPYRIGHT § 3:45 (2016) ("Copyright extends only to works of human authors."); cf. 1 MELVILLE B. NIMMER & DAVID NIMMER, NIMMER ON COPYRIGHT § 5.01[A] (2016) ("[T]he time may not be far off when that question demands answers.").

91. See, e.g., Christopher Buccafusco, *A Theory of Copyright Authorship*, 102 VA. L. REV. 1229, 1260 (2016) ("For purposes of copyright law, an author is a human being who intends to produce one or more mental effects in an audience by an external manifestation of behavior."); 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, 1682 (1997) ("Although not specifically defined, the use of the term 'author' in the Copyright Act

copyright protection. Although there is, as yet, no definitive judicial opinion on the copyrightability of works produced by artificial intelligence, several cases in other contexts reiterate the need for human creativity.⁹²

In the decades that followed the Copyright Office's initial encounter with computer-related works, the insistence on human creation as a prerequisite to copyright actually did little or nothing to impede protection of the computer-related works of that era. The analysis by the National Commission on New Technological Uses (CONTU), created by Congress in 1974 to study copyright issues arising from new technologies,⁹³ was typical. Prompted in part by the Register's 1965 question, the Commission's charge included consideration of the status of "new works" created by computer technology.⁹⁴ The Commission concluded that the requirement of "at least minimal human creative effort"⁹⁵ did not preclude protection for computer-related works because "there is no reasonable basis for considering that a computer in any way contributes authorship to a work produced through its use."⁹⁶

The computer, like a camera or a typewriter, is an inert instrument, capable of functioning only when activated either directly or indirectly by a human. When so activated it is capable of doing only what it is directed to do in the way it is directed to perform.⁹⁷

As understood by CONTU, the computer merely facilitates the fixation of human creativity. Consider computer games, for example. Their audio-visual displays are created by the games' designers and programmers, and courts have not hesitated to extend copyright protection to the displays.⁹⁸ The same holds true for the graphical user

implies that Congress meant a human author.").

92. See, e.g., *Kelley v. Chicago Park Dist.*, 635 F.3d 290, 304 (7th Cir. 2011) (denying copyright protection to a garden and noting that "[a]uthors of copyrightable works must be human; works owing their form to the forces of nature cannot be copyrighted" (quoting 2 PATRY, *supra* note 90, § 3:19 n.1)); *Urantia Found. v. Maaherra*, 114 F.3d 955, 958 (9th Cir. 1997) (explaining in dicta that creations of "divine beings" are not copyrightable; "[s]ome element of human creativity must have occurred").

93. NAT'L COMM'N ON NEW TECH. USES OF COPYRIGHTED WORKS, FINAL REPORT OF THE NATIONAL COMMISSION ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS 4 (1978) [hereinafter FINAL REPORT], <http://digital-law-online.info/CONTU/PDF/index.html>.

94. *Id.* at 4.

95. *Id.* at 45.

96. *Id.* at 44.

97. *Id.*

98. See, e.g., *Data E. U.S., Inc. v. Epyx, Inc.*, 862 F.2d 204, 206 (9th Cir. 1988). The

interfaces of more utilitarian software.⁹⁹ A 1993 novel “written” by Scott French, however, pressed harder against the limits of the computer as “an inert instrument” perspective.¹⁰⁰ French based the book on two novels by best-selling author Jacqueline Susann: *Valley of the Dolls* and *Once Is Not Enough*.¹⁰¹ He identified two hundred idiosyncrasies in Susann’s writing style and turned them into six thousand “rules” that he incorporated into a computer program designed to write like Susann.¹⁰² The program was then used to produce *Just This Once*.¹⁰³ As French described the work, he wrote about a quarter of the prose, the computer wrote about the same amount, and the remainder was a collaboration of man and machine.¹⁰⁴ French’s contribution of text was itself clearly sufficient to support a copyright, but the copyright registration also included the “computer-aided text.”¹⁰⁵

The Copyright Office’s insistence that “a work must be created by a human being”¹⁰⁶ is compatible with CONTU’s understanding of computers as inert tools, and the Copyright Office has long accepted

result is not affected by the fact that the specific sequence of displays depends on the interaction between the game software and the players. *See, e.g.,* Midway Mfg. Co. v. Artic Int’l, Inc., 704 F.2d 1009, 1011 (7th Cir. 1983); Stern Elecs., Inc. v. Kaufman, 669 F.2d 852, 856 (2d Cir. 1982).

99. *See, e.g.,* Apple Comput., Inc. v. Microsoft Corp., 35 F.3d 1435, 1445 (9th Cir. 1994).

100. *See* Tal Vigderson, Note, *Hamlet II: The Sequel? The Rights of Authors vs. Computer-Generated “Read-Alike” Works*, 28 LOY. L.A. L. REV. 401, 402–03 (1994).

101. *Id.*

102. *Id.* at 403.

103. *Id.* at 402–03.

104. Steve Lohr, *Potboiler Springs from Computer’s Loins*, N.Y. TIMES (July 2, 1993), <http://www.nytimes.com/1993/07/02/us/media-business-encountering-digital-age-occasional-look-computers-everday-life.html?pagewanted=all>. A reviewer for *USA Today*, comparing French’s novel with one by Jackie Collins, concluded, “If you do like this stuff, you’d be much, much better off with the one written by the computer.” *Id.*

105. JUST THIS ONCE, Registration No. TX0003633395. The claimant was listed as Scott R. French and the registration covered “original & computer-aided text.” *Id.* The Copyright Office had previously registered a copyright in another literary work containing computer-generated prose and poetry; a 1984 registration for *The Policeman’s Beard Is Half Constructed* listed Joan Hall as the author of the illustrations, William Chamberlain as author of the introduction, and Racter (Chamberlain’s computer program) as author of the “computer prose and poetry.” THE POLICEMAN’S BEARD IS HALF CONSTRUCTED: COMPUTER PROSE AND POETRY, Registration No. TX0001454063. Although section 201(a) of the Copyright Act, 17 U.S.C. § 201(a) (2012), states that copyright “vests initially in the author or authors of the work,” only Chamberlain and Hall were listed as copyright claimants. *See* Andrew Wu, *From Video Games to Artificial Intelligence: Assigning Copyright Ownership to Works Generated by Increasingly Sophisticated Computer Programs*, 25 AM. INTELL. PROP. L. ASS’N Q.J. 131, 154–61 (1997).

106. COMPENDIUM, *supra* note 85, § 313.2.

registrations covering the output of computers in the form of screen displays and other works that reflect human expression.¹⁰⁷ Among the examples of uncopyrightable works offered by the Copyright Office to illustrate its requirement of human creation are "works produced by a machine . . . without any creative input or intervention from a human author," such as an enlargement of an existing work, a conversion in format from analog to digital, and noise reduction on a sound recording.¹⁰⁸ Those works, however, would probably lack the creativity necessary for copyright even if done entirely by a human being.¹⁰⁹

Fifteen years after the *CONTU Report*, Professor Arthur Miller, who had served as one of its commissioners, asked, "Is anything new since CONTU?"¹¹⁰ and could still answer "no": "CONTU's conclusion over fourteen years ago that even 'computer-generated' works appear to have enough human authorship to qualify for copyright protection continues to be true."¹¹¹ He wisely foresaw, however, that the future might be different, and he expressed confidence in the law's ability to adjust: "[I]f the day arrives when a computer really is the sole author of an original artistic, musical, or literary work (whether a novel or a computer program), copyright law will be embrative and malleable enough to assimilate that development into the world of protected works."¹¹² That day is apparently here. Indeed, even before Professor Miller's comments, another government report, this one produced by the Congressional Office of Technology Assessment (OTA) in 1986,¹¹³ had already openly questioned CONTU's narrow perspective:

It is misleading, however, to think of programs as inert tools of creation, in the sense that cameras, typewriters, or any other tools of creation are inert. Moreover, CONTU's comparison of a computer to other instruments of creation begs the question of

107. See Registration Decision; Registration and Deposit of Computer Screen Displays, 53 Fed. Reg. 21817, 21818 (June 10, 1988).

108. COMPENDIUM, *supra* note 85, § 313.2.

109. See, e.g., *Feist Publ'ns., Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345 (1991) (explaining that copyright requires "at least some minimal degree of creativity" (citing 1 NIMMER & NIMMER, *supra* note 90, § 2.01[A], [B])).

110. Arthur R. Miller, *Copyright Protection for Computer Programs, Databases, and Computer-Generated Works; Is Anything New Since CONTU?*, 106 HARV. L. REV. 977, 977 (1993).

111. *Id.* at 1068.

112. *Id.* at 1073.

113. See OFFICE OF TECH. ASSESSMENT, PB87-100301, INTELLECTUAL PROPERTY RIGHTS IN AN AGE OF ELECTRONICS AND INFORMATION 72-73 (1986), <http://www.princeton.edu/~ota/disk2/1986/8610/8610.PDF>.

whether interactive computing employs the computer as co-creator, rather than as an instrument of creation.¹¹⁴

Technology is moving further and further into the realm of computer-generated works. As human beings recede from direct participation in the creation of many works, continued insistence on human authorship as a prerequisite to copyright threatens the protection—and, ultimately, the production¹¹⁵—of works that are indistinguishable in merit and value from protected works created by human beings. In addition to consigning an increasingly large and diverse library of works to the public domain, the human authorship requirement imposes substantial burdens of classification. The relationship between human and computer in the creative process spans a continuum extending from a novelist's use of a spell-checker to the completely autonomous creation of a work by an artificial intelligence system functioning without human intervention or even human instigation. It encompasses a computer user who triggers the production of a musical work by entering "Compose" or perhaps "Compose Jazz" into music-writing software; a publisher who inputs statistics from a football game or data from a corporate earnings statement into a program that generates news stories; and a programmer who has incorporated detailed templates or instructions to guide a computer in the production of a literary or graphic work. Some of the resulting works may be considered only computer-assisted and hence copyrightable, while for others the contribution of the human user or programmer to the ultimate expression of the work may be too attenuated to represent the human authorship now considered necessary for copyright protection. Line-drawing, of course, is inherent in the nature of copyright law with standards such as "minimal degree

114. *Id.* at 72. The OTA report continued:

It is still an open question whether the programmed computer is unlike other tools of creation One must ask, therefore, whether machines or interactions with machines might produce a pattern of output that would be considered creative or original if done by a human being. If machines are in any sense co-creators, the rights of programmers and users of programs may not be easily determined within the present copyright system.

Id.; see also Annemarie Bridy, *Coding Creativity: Copyright and the Artificially Intelligent Author*, 2012 STAN. TECH. L. REV. 5, 23 (2012) ("Between the release of the CONTU . . . and the OTA report[s] . . . , the PC revolution had begun." (citing Roger Schank & Christopher Owens, *The Mechanics of Creativity*, in *THE AGE OF INTELLIGENT MACHINES* 478–81 (Raymond Kurzweil ed., 1991))).

115. See *infra* text accompanying notes 135–37.

of creativity"¹¹⁶ for copyrightability and "substantial similarity"¹¹⁷ for infringement. Those standards, however, focus primarily on the content of the works themselves. In the case of computer-related works, however, the content of the work provides little or no evidence of the relevant contributions of computer and human. Indeed, as technology continues to develop, it is increasingly difficult to distinguish computer-generated works from their entirely human-created counterparts.¹¹⁸ The necessity of evaluating the respective contributions of computer and human in determining copyrightability requires an investigation into the creative process far beyond the modest inquiry undertaken by the Copyright Office in evaluating an application for copyright registration, which relies simply on a visual examination of the deposited work and registration materials.¹¹⁹ Professor Miller expressed confidence that copyright law would prove sufficiently malleable to assimilate computer-generated works.¹²⁰ A quarter-century later, it remains an open question whether or how the law will respond. One promising approach, discussed below, rests on changing the emphasis from "authors" to "writings."

III. WRITINGS AND AUTHORS

Determining the copyrightability of computer-generated works by asking whether a computer can be the "author" of a copyrightable work is the wrong place to begin. The purpose of patent and copyright law is explicitly stated in the Constitution: "To Promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."¹²¹ The aim of copyright is thus to foster the creation of writings by granting exclusive rights to authors. As described by the Supreme Court, "The primary objective of the Copyright Act is to encourage the production of original literary, artistic, and musical

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

117. 1 NIMMER & NIMMER, *supra* note 90, § 13.03[A].

118. For examples of computer-generated works, see *supra* text accompanying notes 48-49, 55-57. See also Bridy, *supra* note 114, at 3 ("As the state of the art continues to advance in AI and related areas, however, we are moving incrementally but surely into an age of digital authorship, in which digital works (i.e., software programs) will, relatively autonomously, produce other works that are indistinguishable from works of human authorship."); Clerwall, *supra* note 56, at 527 ("As far as this study is concerned, the readers are not able to discern automated content from content written by a human.").

119. See COMPENDIUM, *supra* note 85, § 602.4(A)-(C).

120. See *supra* text accompanying note 112.

121. U.S. CONST. art. I, § 8.

expression for the good of the public.”¹²² Congress too has emphasized that the crux of the constitutional grant is “writings,” not “authors,” stating that copyright is “[n]ot primarily for the benefit of the author, but primarily for the benefit of the public . . . [i]n that it will stimulate writing.”¹²³ Thus, writings rather than authors are the more obvious starting point, and asking whether a computer can create a writing seems more pertinent than asking whether it can be an author. Since the benefits that writings offer to the public are the ultimate object of the constitutional clause and implementing legislation, the question becomes whether works generated by computers provide the same benefits to the public as works produced by human beings.¹²⁴ When judged by the standards of copyrightability applied to human-created works, it is clear that they do.

The standards of copyrightability are set out in § 102(a) of the Copyright Act.¹²⁵ Copyright subsists “in original works of authorship fixed in any tangible medium of expression.”¹²⁶ The fixation requirement presents no special problem for computer-generated works. The output of a computer can be fixed in digital formats, paper, or almost any other medium available to a human creator. The output must also be “original”, which in copyright law means only that the work must be an independent creation as opposed to a copy of a preexisting work.¹²⁷ If a computer produces output without copying from another work, the output is thus “original” for purposes of

122. *Fogarty v. Fantasy, Inc.*, 510 U.S. 517, 524 (1994); *see also* *Fox Film Corp. v. Doyal*, 286 U.S. 123, 127 (1932) (“The sole interest of the United States and the primary object in conferring the monopoly lie in the general benefits derived by the public from the labors of authors.”), *quoted in* *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417, 429 (1984).

123. H.R. REP. No. 60-2222, at 7 (2d Sess. 1909).

124. *See* Miller, *supra* note 110, at 1067 (“The Copyright Clause’s objective is no less served if ‘the Progress of Science and useful Arts’ is promoted through computers, or by humans in collaboration with computers, rather than by humans alone.”). Physicist Stephen Hawking believes “there is no deep difference between what can be achieved by a biological brain and what can be achieved by a computer.” Rory Cellan-Jones, *Stephen Hawking—Will AI Kill or Save Humankind*, BBC (Oct. 20, 2016), <http://www.bbc.com/news/technology-37713629>.

125. 17 U.S.C. § 102(a) (2012).

126. *Id.*

127. *E.g.*, *Alfred Bell & Co. v. Catalda Fine Arts, Inc.*, 191 F.2d 99, 102 (2d Cir. 1951). “‘Original’ in reference to a copyrighted work means that the particular work ‘owes its origin’ to the ‘author.’” *Id.* (quoting *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 57–58 (1884)). “Originality in this context ‘means little more than a prohibition of actual copying.’” *Id.* at 103 (quoting *Hoague-Sprague Corp. v. Frank C. Meyer, Inc.*, 31 F.2d 583, 586 (E.D.N.Y. 1929)); *see also* 1 NIMMER & NIMMER, *supra* note 90, § 2.01[A].

copyright. The output, however, must also be "a work of authorship," which, according to the Supreme Court in *Feist Publications, Inc. v. Rural Telephone Service Co.*,¹²⁸ requires that "it possesses at least some minimal degree of creativity."¹²⁹ Justice Holmes had long ago warned of the dangers of a qualitative measure of creativity in a case dealing with the copyrightability of circus posters:

It would be a dangerous undertaking for persons trained only to the law to constitute themselves final judges of the worth of pictorial illustrations, outside of the narrowest and most obvious limits. At the one extreme, some works of genius would be sure to miss appreciation. . . . At the other end, copyright would be denied to pictures which appealed to a public less educated than the judge.¹³⁰

In *Feist*, the Court embraced a quantitative standard, demanding only "more than a *de minimis* quantum of creativity,"¹³¹ and noted, "[t]o be sure, the requisite level of creativity is extremely low; even a slight amount will suffice."¹³² Many computer-generated works easily meet that standard.¹³³ Indeed, many are indistinguishable from their copyrightable human-created counterparts.¹³⁴ Computer-generated works are thus within the subject matter of copyright unless, as the Copyright Office insists,¹³⁵ the minimal degree of creativity necessary to constitute a work of authorship must be provided directly by a human

128. 499 U.S. 340 (1991).

129. *Id.* at 345 (subsuming both the independent-creation and "work of authorship" requirements under the "originality" requirement, the Court stated that "[o]riginal, as the term is used in copyright, means only that the work was independently created by the author (as opposed to copied from other works), and that it possesses at least some minimal degree of creativity." (citing 1 NIMMER & NIMMER, *supra* note 90, § 2.01[A], [B])).

130. *Bleistein v. Donaldson Lithographing Co.*, 188 U.S. 239, 251-52 (1903).

131. *Feist*, 499 U.S. at 363.

132. *Id.* at 345.

133. See Miller, *supra* note 110, at 1046 ("[I]f using a computer to create a work does not render it ineligible for copyright, what requirement must it meet to be eligible? The simple answer is the same prerequisites that any other copyrighted work must satisfy."); cf. *Meshwerks, Inc. v. Toyota Motor Sales U.S.*, 528 F.3d 1258, 1260-64 (10th Cir. 2008) (applying the customary standards to determine the copyrightability of computer-generated digital models of automobiles and holding that the resulting works were merely copies of the original cars and hence not original).

134. See Bridy, *supra* note 114, at 3; cf. Miller, *supra* note 110, at 1046 ("Thus, an independently computer-generated version of *Ulysses* should enjoy as much protection as James Joyce's original.").

135. See COMPENDIUM, *supra* note 85, § 306 (entitled "The Human Authorship Requirement").

being.

Since a work's contribution to the public welfare does not seem dependent on the process that produced it, what explains the reluctance to extend copyright protection to works generated by computers? One possibility may be a belief that economic incentives are unnecessary to stimulate computers to generate works. They have no bills to pay, they do not dream of bigger houses or fancier cars, nor worry about providing for their children or grandchildren. If we can reap the benefits of their output without paying the price of restricted access and use inherent in copyright protection, so much the better. Professor Ralph Clifford has offered the fullest articulation of this rationale:

The current federal systems are based on the axiom that works will be created only through the exercise of human creativity, whether machine-assisted or not. Once the computer can literally "do it on its own," the created works fall outside of the scope of intellectual property protection. Although this exclusion from coverage was not intentional, it is the appropriate policy for the present age. No extra incentives are needed to make currently available creative computers produce works—if the computer program is executed, the works will result.¹³⁶

There is, of course, an obvious rebuttal. At least for now, the production of computer-generated works requires human beings to develop, improve, distribute, and use the computer technology and to disseminate the resulting output. The incentive of copyright protection may play a role, large or small, in all of these human activities.¹³⁷

Another explanation for the reluctance to extend copyright to computer-generated works may be the fear that if computers are considered capable of producing writings protected by copyright, then

136. Clifford, *supra* note 91, at 1702–03; *see also* 1 GOLDSTEIN, *supra* note 90, § 2.2.2 ("An added reason to deny copyright to computer-generated products is that withholding copyright will not in all likelihood deplete their production."); *cf.* OFFICE OF TECH. ASSESSMENT, *supra* note 113, at 76 ("If copyright is to be granted to machine-produced works, it would signal a new role for copyright, and a departure from its traditional role as an incentive for authors.").

137. *See, e.g.*, Miller, *supra* note 110, at 1067 ("A computer will not refuse to function if its output does not receive copyright protection, but the people who are motivated to prepare its programming and operate the system might." (footnote omitted)); Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1226 (1986) ("Perhaps the best reason to allocate ownership interests to someone, however, is that someone must be motivated, if not to create the work, then to bring it into public circulation.").

computers must inevitably be considered the authors of those writings. The prospect of machines as authors is indeed worrisome. The implications under the Copyright Act are clear: "Copyright in a work protected under this title vests initially in the author or authors of the work."¹³⁸ If a machine is an author and hence a copyright owner, we are completely adrift with respect to basic issues such as licensing and assignment, not to mention copyright duration, which is "the life of the author and 70 years after the author's death."¹³⁹ While it may be fun to speculate about the personhood of machines,¹⁴⁰ our current jurisprudence is simply not ready to declare that machines can own property.¹⁴¹ The concern over non-human authors recently arose in a case involving not a machine but a monkey. In 2014, news stories reported on a dispute between a photographer and *Wikipedia* over the web-based encyclopedia's reproduction of a "selfie" taken by a crested black macaque monkey named Naruto using the photographer's camera.¹⁴² *Wikipedia* refused the photographer's request to remove the photo from its website, arguing that he did not own the copyright.¹⁴³ The same photograph was in the news the following year when People for the Ethical Treatment of Animals filed a copyright infringement suit on behalf of Naruto, alleging that the photographer had infringed the monkey's copyright by reproducing the photograph in a book.¹⁴⁴ The court dismissed the complaint, holding that a monkey could not be an "author" under the Copyright Act.¹⁴⁵ That holding, however, does not

138. 17 U.S.C. § 201(a) (2012).

139. *Id.* § 302(a).

140. See, e.g., Gabriel Hallevy, *The Criminal Liability of Artificial Intelligence Entities—From Science Fiction to Legal Social Control*, 4 AKRON INTELL. PROP. J. 171, 199–201 (2010) (advocating potential criminal liability for artificial intelligence systems); David C. Vladeck, *Machines Without Principals: Liability Rules and Artificial Intelligence*, 89 WASH. L. REV. 117, 125–28 (2014) (pondering the personhood of machines for purposes of tort liability).

141. See Bridy, *supra* note 114, at 51 ("The law as it is currently configured cannot vest ownership of the copyright in a procedurally generated work in the work's author-in-fact, because the work's author-in-fact—a generative software program—has no legal personhood.").

142. *Photographer 'Lost £10,000' in Wikipedia Monkey 'Selfie' Row*, BBC (Aug. 7, 2014), <http://www.bbc.com/news/uk-england-gloucestershire-28674167>.

143. *British Photographer in Wikipedia Monkey Selfie Row*, BBC (Aug. 7, 2014), <http://www.bbc.com/news/uk-28684353>.

144. *Naruto v. Slater*, No. 15-cv-04324-WHO, 2016 WL 362231, at *1 (N.D. Cal. Jan. 28, 2016).

145. *Id.* at *4. The monkey has appealed to the Ninth Circuit. See *'Monkey Selfie' Case Headed to U.S. Court of Appeals*, PETA: BLOG (Aug. 2, 2016), <http://www.peta.org/blog/monkey-selfie-case-headed-u-s-court-appeals>. The photographer has claimed that he placed the camera on a tripod amidst a troop of monkeys, selected the lens and set the

necessarily compel the conclusion that a monkey—or a computer—cannot create a copyrightable work that is owned by a human author.

IV. AUTHORS AS ORIGINATORS

The syllogism that if computers create “writings” protected by copyright, they must also be “authors” and therefore copyright owners rests on the assumption that the “author” of a work must inevitably be the person or entity that generated the creative expression. However, the concept of “author” is broader than this customary focus on the expression-creator would suggest—broad enough to subsume human beings who instigate the creation of computer-generated works. The Copyright Act does not define “author.”¹⁴⁶ It does, however, contain at least two provisions that specifically extend that concept to persons who did not in fact create the copyrighted expression for which they are credited as “authors.”¹⁴⁷ The most obvious is the “work made for hire” doctrine. Section 201(b) of the Copyright Act states, “In the case of a work made for hire, the employer or other person for whom the work was prepared is considered the author for purposes of this title.”¹⁴⁸

camera settings, hoping that the monkeys would become curious and press the shutter button. See Mike McPhate, *Monkey Has No Right to Its Selfie, Federal Judge Says*, N.Y. TIMES (Jan. 8, 2016), <http://www.nytimes.com/2016/01/09/business/media/monkey-has-no-rights-to-its-selfie-federal-judge-says.html>. Thus, much like a wildlife photographer who sets up motion-sensitive cameras in a jungle, the photographer has arguably contributed sufficient human creativity to claim copyright under normal principles of authorship. The fact that the monkey caused the ultimate fixation of the work should not undermine the photographer's claim of ownership. As the Nimmer treatise reminds us, “[T]he originator, rather than the fixer, should be deemed the ‘author.’ For the distinction between one poet who brandishes a quill (or word processor) and another who dictates to a stenographer cannot call for a differing legal conclusion as to ‘authorship.’” 1 NIMMER & NIMMER, *supra* note 90, § 1.06[A] (footnote omitted) (citing Marci A. Hamilton, Comment, *Commissioned Works as Works Made for Hire Under the 1976 Copyright Act: Misinterpretation and Injustice*, 135 U. PA. L. REV. 1281, 1302 n.118 (1987)). The case for denying copyright is strongest when there is little or no human involvement in the photograph. See *The Amazing Elephant Selfie. But Is It a World First?*, BBC (May 22, 2015), <http://www.bbc.com/news/blogs-trending-32848199> (reporting on elephants who have apparently grabbed cameras and cell phones that they had mistaken for food and took accidental selfies before dropping the items in disappointment).

146. See 17 U.S.C. § 101 (2012) (listing definitions). Nor does the Berne Convention, the primary source of our international copyright obligations. See Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, S. TREATY DOC. NO. 99–27.

147. See § 201(a)–(b).

148. *Id.* § 201(b). “[W]ork made for hire” includes “a work prepared by an employee within the scope of his or her employment,” along with certain commissioned works. *Id.* § 101 (defining “work made for hire”).

Thus, a person (whether natural or legal) who may have played no role at all in the actual creation of the copyrighted work is nevertheless treated as its "author" and owner. As another example, consider the rule on authorship of joint works.¹⁴⁹ According to section 201(a), "[t]he authors of a joint work are coowners of copyright in the work."¹⁵⁰ Joint works include not only works in which the individual contributions are "inseparable"¹⁵¹ but also works where the contributions are merely "interdependent parts of a unitary whole"¹⁵²—the music and lyrics of a song, for example. The result is that an author of a joint work co-owns the copyright even in parts of the work that she did not herself create.¹⁵³ The "work made for hire" rule that designates employers as "authors" has been explained with the observation that "the motivating factor in producing the work was the employer who induced the creation."¹⁵⁴ William Patry, in his treatise on copyright law, views the employer as author rule as an example of an "instrumental approach" to copyright authorship:

The public has no inherent interest in who owns the copyright so long as works are placed into the marketplace. Under this instrumental approach to copyright, "author" is a construct denoting merely the initial owner of all rights. That initial owner may be the actual individual who created the work, but

149. See *id.* § 201(a).

150. *Id.*

151. *Id.* § 101 (defining "joint work").

152. *Id.*

153. Even when a work to which several persons have contributed is neither a work made for hire nor a joint work, non-freestanding original artistic contributions are owned not by the contributors who created them but by the "author" of the work to which they contributed. 16 Casa Duse, L.L.C. v. Merkin, 791 F.3d 247, 258 (2d Cir. 2015). The Copyright Act is also open to broad interpretations of "author" in at least two other respects. Section 104A of the Act restores copyrights in the United States for certain foreign works that had entered the public domain in this country because of noncompliance with our required formalities. See § 104(a)–(b). That section, however, explicitly defers to the law of the source country in determining who is considered the "author" and copyright owner of the restored work. *Id.* Similarly, although foreign works are subject to the same criteria for copyright protection in the United States that are applicable to works of U.S. authors, see *id.* (extending copyright to foreign unpublished and published "works specified by sections 102 and 103"), the courts have held that the ownership of copyrightable foreign works is determined by the law of the foreign country. See, e.g., Itar-Tass Russian News Agency v. Russian Kurier, Inc., 153 F.3d 82, 92 (2d Cir. 1998).

154. Picture Music, Inc. v. Bourne, Inc., 457 F.2d 1213, 1216 (2d Cir. 1972) (quoting Note, *Renewal of Copyright—Section 23 of the Copyright Act of 1909*, 44 COLUM. L. REV. 712, 716 (1944)).

need not be.¹⁵⁵

The Supreme Court sees no constitutional impediment to the expansive understanding of “author” inherent in the work-for-hire doctrine.¹⁵⁶ Indeed, the Court’s copyright case law has consistently adopted a broad, utilitarian interpretation of “authors” and “writings.” In *Goldstein v. California*,¹⁵⁷ for example, the Court considered the breadth of the constitutional terms “writings” and “authors” in the course of determining the preemptive scope of the Copyright Clause:

These terms have not been construed in their narrow literal sense but, rather, with the reach necessary to reflect the broad scope of constitutional principles. While an “author” may be viewed as an individual who writes an original composition, the term, in its constitutional sense, has been construed to mean an “originator,” “he to whom anything owes its origin.”¹⁵⁸

A person who can be viewed as “the motivating factor in producing” or the “originator” of a computer-generated work is thus well within the constitutional dimensions of the concept of “author.” In the absence of any narrower definition of “author” in the Copyright Act, such an “originator” should be eligible to assert copyright ownership under current law.

155. 2 PATRY, *supra* note 90, § 3:19. Professor Shyamkrishna Balganesh proposes an analysis of authorship that looks first at “creation in fact” to determine “whether an actor’s participation in the creative process contributed as a factual matter to the production of the creative expression.” Shyamkrishna Balganesh, *Causing Copyright*, 117 COLUM. L. REV. 1, 8 (2017). An affirmative answer to that inquiry triggers a further investigation into “legal creation,” which examines whether that contribution “is significant enough, when viewed in light of copyright’s purposes (i.e., normatively), to generate protection and authorship.” *Id.* at 8–9. It asks, in other words, “whether the identified human agency ought to lead to an authorship claim as a matter of copyright’s goals and principles.” *Id.* at 61. Although he notes that “American copyright law scholars continue to debate the ideal approach to authorship of computer-generated works,” he offers no conclusions. *Id.* at 73.

156. See *Cnty. for Creative Non-Violence v. Reid*, 490 U.S. 730, 739–51 (1989); *Childress v. Taylor*, 945 F.2d 500, 506 n.5 (2d Cir. 1991) (“Though the United States is perhaps the only country that confers ‘authorship’ status on the employer of the creator of a work made for hire, its decision to do so is not constitutionally suspect.” (citation omitted)).

157. 412 U.S. 546, 555–60 (1973).

158. *Id.* at 561 (quoting *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 58 (1884)). The *Burrow-Giles* case, quoted by the Court in *Goldstein*, held that the plaintiff could claim copyright protection as the “author” of a photograph. See *Burrow-Giles Lithographic Co.*, 111 U.S. at 61.

The meaning of "author" in the context of non-human creations is at the heart of a series of dueling dicta emanating from cases concerning works attributed to "voices." The first is an English case decided in 1926, *Cummins v. Bond*,¹⁵⁹ involving a manuscript created through "automatic writing" on the part of the plaintiff.¹⁶⁰ When the plaintiff sought an injunction against publication by the defendant, all of the parties to the lawsuit were in agreement that the actual source of the work was a person who had been deceased for some 1900 years.¹⁶¹ The defendant argued that there could be no copyright since the plaintiff was "the mere conduit pipe" by which the work had been conveyed.¹⁶² The court sustained the copyright on the basis of the plaintiff's contribution in translating the work from the unknown language in which it had been communicated.¹⁶³ In dicta, however, Judge Eve declared that "apart altogether from these considerations," he was unprepared and incompetent to decide "that the authorship and copyright rest with some one already domiciled on the other side of the inevitable river."¹⁶⁴ Viewing the matter "as a terrestrial one,"¹⁶⁵ the copyright must rest instead with the plaintiff. The first American encounter with works attributed to non-human authorship was apparently *Oliver v. Saint Germain Foundation*.¹⁶⁶ The plaintiff, claiming that his work had been dictated by the spirit of a deceased entity from another world, brought an infringement action against a defendant who had published a similar work.¹⁶⁷ The defendant moved to dismiss, arguing that the plaintiff was not the author of the work and there was no evidence of an assignment from the deceased alien entity.¹⁶⁸ The court sustained the motion, although its analysis focused entirely on a comparison of the two works in order to determine infringement,¹⁶⁹ which would be moot absent a valid copyright.

A work consisting of the teachings of spiritual entities communicated through a psychiatric patient spawned several decisions

159. [1927] 1 Ch. 167.

160. *Id.* at 168.

161. *Id.* at 172-73.

162. *Id.* at 175.

163. *Id.*

164. *Id.*

165. *Id.* *Cummins* was subsequently invoked to uphold copyright in portrait sketches of deceased persons the artist had never seen that were produced under the "influence" of extra-sensory perception. *Leah v. Two Worlds Publ'g Co.*, [1951] Ch. 393 at 395 (Eng.).

166. 41 F. Supp. 296 (S.D. Cal. 1941).

167. *Id.* at 296-97.

168. *Id.*

169. *Id.* at 299.

that more directly confront the issue of human creation and copyright. In *Urantia Foundation v. Burton*,¹⁷⁰ the plaintiff claimed copyright in *The Urantia Book*, a religious and philosophical tract that was alleged to have been written by a patient of William Sadler, a Chicago psychiatrist, while the patient was in an unconscious or semi-conscious state.¹⁷¹ A defendant who was sued for infringement after reproducing and distributing sections of the work requested a declaratory judgment that the copyright was invalid.¹⁷² According to the court, both parties believed that the book was the result of spiritual inspiration.¹⁷³ The court's analysis was straightforward:

[T]here has been some discussion as to whether Dr. Sadler's patient was the author of the book or was merely a conduit for some spiritual author. Legally, however, the source of the patient's inspiration is irrelevant. No one contends that *The Urantia Book* was not original and therefore not copyrightable. The patient, as author, had an immediate, common law copyright, or right of first publication, in the book.¹⁷⁴

Finding that the copyright had been transferred by the patient to Dr. Sadler and by Dr. Sadler to the Urantia Foundation, the court granted the Foundation summary judgment on its infringement claim.¹⁷⁵ A subsequent suit by the Urantia Foundation against another alleged infringer produced a similar statement.¹⁷⁶ Declining to rule on the actual provenance of the work, the district court in *Urantia Foundation v. Maaherra*¹⁷⁷ rejected the defendant's contention that the book was not copyrightable because it originated with spiritual entities: "Nor is it necessary that the authorship stem from human effort. . . . Whether *The Urantia Book* is a divine revelation dictated by divine beings is irrelevant to the issue of whether the book is a literary work within the meaning of 17 U.S.C. § 102."¹⁷⁸ The district court subsequently concluded, however, that the Foundation could not claim

170. No. K 75-255 CA 4, 1980 WL 1176, at *1 (W.D. Mich. Aug. 27, 1980).

171. *Id.*

172. *Id.*

173. *Id.*

174. *Id.* (citing NIMMER ON COPYRIGHT §§ 2.02, 5.01[B] (1979); *Schwartz v. Broad Music Inc.*, 180 F. Supp. 322 (S.D.N.Y. 1959)).

175. *Id.* at *5.

176. See *Urantia Found. v. Maaherra*, 895 F. Supp. 1337, 1338 (D. Ariz. 1995), *rev'd*, 114 F.3d 955 (9th Cir. 1997).

177. *Id.* at 1337-38.

178. *Id.* at 1338.

ownership of the renewal copyright.¹⁷⁹ The decision on ownership of the renewal copyright was reversed by the Ninth Circuit.¹⁸⁰ The appellate court began its analysis with a "threshold issue"—"whether the work, because it is claimed to embody the words of celestial beings rather than human beings, is copyrightable at all."¹⁸¹

The copyright laws, of course, do not expressly require "human" authorship, and considerable controversy has arisen in recent years over the copyrightability of computer-generated works. We agree with Maaherra, however, that it is not creations of divine beings that the copyright laws were intended to protect, and that in this case some element of human creativity must have occurred in order for the Book to be copyrightable. At the very least, for a worldly entity to be guilty of infringing a copyright, that entity must have copied something created by another worldly entity.¹⁸²

Whether the court would maintain the same insistence on human creativity in the case of a worldlier entity such as a computer is unclear. The comment, in any case, is dicta, since the Ninth Circuit ultimately found the required "element of human creativity" in the selection and arrangement of the revelations, which it attributed to questions posed to the celestial beings by followers of Dr. Sadler.¹⁸³

Perhaps the strongest declaration in support of copyright in a work attributed to a "voice" is *Penguin Books U.S.A., Inc. v. New Christian Church of Full Endeavor, Ltd.*¹⁸⁴ A psychology professor at the College of Physicians and Surgeons of the Columbia Presbyterian Medical Center produced a work through a process she described as "rapid inner dictation" of words emanating from a "Voice" (whom she later identified as Jesus) who told her to "[p]lease take notes."¹⁸⁵ Her publisher brought suit against a defendant who published substantial quotations from the work.¹⁸⁶ Invoking the Ninth Circuit's approach in *Urantia*, the court held that the work was clearly copyrightable based on the editing done

179. *Id.* at 1351.

180. *Urantia Found. v. Maaherra*, 114 F.3d 955, 964 (9th Cir. 1997).

181. *Id.* at 958.

182. *Id.* (citation omitted).

183. *Id.* at 958–59.

184. No. 96 CIV.4126 (RWS), 2000 WL 1028634, at *8 (S.D.N.Y. July 25, 2000), *vacated* by 2004 WL 906301, at *1 (S.D.N.Y. Apr. 27, 2004).

185. *Id.* at *2.

186. *Id.* at *8.

by the professor and other human participants.¹⁸⁷ In dicta, however, the court pushed well beyond the Ninth Circuit. It emphasized that “there is no evidence to suggest that the [work] would have come into existence” if the professor had not “opened herself up to the possibility of receiving this vision.”¹⁸⁸ Editing aside, the court found “an independent basis for affirming the originality of the [work]: as a literary work authored by [the professor].”¹⁸⁹ After quoting the proposition of the trial court in *Urantia* that “[w]hether The Urantia Book is a divine revelation dictated by divine beings is irrelevant,” the court in *Penguin Books* concluded, “[t]his approach is sensible. As a matter of law, dictation from a non-human source should not be a bar to copyright.”¹⁹⁰

Several of the “voices” cases extend the concept of “author” to the originator of the work, even when that person was not the actual creator of the work’s expression.¹⁹¹ Adoption of an analogous understanding of “author” in the context of computer-generated works draws support from the approach taken by many foreign jurisdictions. Unlike the United States copyright statute, it is not uncommon for foreign copyright statutes to include a general definition of the term “author.” These definitions typically speak of the person who “creates” the work.¹⁹² Many of the statutes, however, are more specific as to the “author” of a “computer-generated” work. According to the most common formulation, the “author” of a “computer-generated” work is

187. *Id.* at *11.

188. *Id.* at *10.

189. *Id.* at *11.

190. *Id.* at *11–12. In a subsequent decision the court held that the copyright was invalid due to publication without notice of copyright. *Penguin Books U.S., Inc. v. New Christian Church of Full Endeavor, Ltd.*, 288 F. Supp. 2d 544, 556 (S.D.N.Y. 2003). An Australian commentator, examining primarily Australian, British, and American law in connection with claims of copyright in translations of the Bible could assert, “When faced with claims of supernatural authorship, courts invariably conclude that humans own the intellectual property.” Roger Syn, © *Copyright God: Enforcement of Copyright in the Bible and Religious Works*, 14 REGENT U. L. REV. 1, 24 (2001–2002).

191. See Bridy, *supra* note 114, at 49 (“[T]he automatic writing cases suggest that such works should be regarded as copyrightable, despite their non-human genesis, because they have a sufficient nexus to human creativity.”).

192. See, e.g., Copyright Ordinance, (1997) Cap. 528, § 11(1) (H.K.) (“[A]uthor’ (□□), in relation to a work, means the person who creates it.”); Copyright and Related Rights Act, 2000 (Act No. 28/2000) § 21 (Ir.) (“[A]uthor’ means the person who creates a work.”); Copyright Act 1994, s 5, sub 1 (N.Z.) (“[A]uthor of a work is the person who creates it.”); Copyright Act 98 of 1978 § 1 (S. Afr.) (“[A]uthor’ . . . means the person who first makes or creates the work.”); Copyright, Designs and Patents Act 1988 c. 48, § 9(1) (U.K.) (“[A]uthor’, in relation to a work, means the person who creates it.”).

"the person by whom the arrangements necessary for the creation of the work are undertaken."¹⁹³ That standard expands the concept of authorship beyond persons who actually create copyrightable expression to persons who originate the *process* of creating copyrightable expression.

Who then is the originator of a computer-generated work and hence plausibly its author and copyright owner? The *CONTU Report*,¹⁹⁴ viewing a computer "like a camera or a typewriter"¹⁹⁵ that serves merely to assist human creativity, saw "no special problem"¹⁹⁶ with computer-related works. Ownership of the resulting work was clear: "The obvious answer is that the author is one who employs the computer."¹⁹⁷ Professor Pamela Samuelson, writing only a few years after CONTU, foresaw what the CONTU commissioners had ignored—computers would inevitably progress toward more autonomous production.¹⁹⁸ After surveying the alternatives, however, she concurred with CONTU that even then the user of the computer should be considered the author and copyright owner.¹⁹⁹ This result aligns well with the incentive rationale for copyright protection. A computer-generated work will not come into existence unless a user is motivated to engage the machinery of its creation.²⁰⁰ Perhaps inevitably, some computer-generated works will one day be created at the instigation of

193. *E.g.*, Copyright Ordinance, (1997) Cap. 528 § 11(3) (H.K.); Copyright and Related Rights Act, 2000 (Act No. 28/2000) § 21(f) (Ir.); Copyright Act 1994, s 5, sub 2, pt a (N.Z.); Copyright Act 98 of 1978 § 1 (S. Afr.); Copyright, Designs and Patents Act 1988 c.48, § 9(3) (U.K.); *cf.* Copyright (Amendment) Act, 2012, No. 27, Acts of Parliament, 2012 §2(d)(vi) (India) ("Author" means . . . in relation to . . . work . . . which is computer-generated, the person who causes the work to be created.).

194. FINAL REPORT, *supra* note 93.

195. *Id.* at 44.

196. *Id.* at 46.

197. *Id.* at 45.

198. *See* Samuelson, *supra* note 137, at 1196–97.

199. *Id.* at 1192 ("[I]n general, the user of a computer generator program should be considered the author of a computer-generated work, and should be free to exploit this product commercially."). This conclusion seems consistent with the results under foreign laws that designate the author of a computer-generated work as the "the person by whom the arrangements necessary for the creation of the work are undertaken." *See supra* text accompanying note 192–93; *see also* GERALD DWORKIN & RICHARD D. TAYLOR, BLACKSTONE'S GUIDE TO THE COPYRIGHT, DESIGNS AND PATENTS ACT 1988, at 47 (1989) ("The [UK] Act therefore *treats* the person who undertakes 'the arrangements necessary for the creation of the work' as the author and that will normally be the operator or the person directing the operation of the machine.").

200. *See* Miller, *supra* note 110, at 1066 ("[S]omeone has to instruct the computer to run a specific program so that a particular work will be produced.").

the computer itself. However, as both Professor Samuelson²⁰¹ and the Supreme Court²⁰² recognize, maintaining incentives for humans to *disseminate* works is also critical in insuring the ultimate public benefits sought by copyright.

Professor Annemarie Bridy, in a broad philosophical examination of the nature of authorship and creativity, advocates an alternative solution to the question of ownership of computer-generated works.²⁰³ After observing that the computer itself lacks the legal personhood necessary for copyright ownership,²⁰⁴ she concludes that the work made for hire doctrine is the most appropriate framework for resolving the ownership issue: “With respect to works of AI authorship, treating the programmer like an employer—as the author-in-law of a work made by another—would avoid the problem of vesting rights in a machine and ascribing to a machine the ability to respond to copyright’s incentives.”²⁰⁵ However, if computers lack “personhood” for purposes of copyright ownership, it seems wrong to then characterize them as “employees” for purposes of the work made for hire doctrine. There are also practical reasons for resisting the programmer as author and copyright owner solution. Locating ownership in the programmer does not align very well with the incentive rationale for copyright. The market already supplies programmers with incentive to create software in the form of potential sales revenues or licensing royalties from prospective users. Ownership in the programmer also fails to afford an incentive for users to actually employ the program to generate new works for the public. If copyright ownership of the works produced by the software is important to the programmer, she can, of course, retain control over the program and claim ownership of those works as the user of the software.²⁰⁶ Alternatively, she can bargain with purchasers

201. See Samuelson, *supra* note 137, at 1227 (“[Users] are in much the same position as traditional authors in the sense that they are in the best position to take the initial steps that will bring a work into the marketplace.”). But see 1 GOLDSTEIN, *supra* note 90, § 2.3, at 2.27, and Clifford, *supra* note 91, at 1702–03, which both conclude that the incentive of copyright is unnecessary to the production of computer-generated works.

202. See *Golan v. Holder*, 132 S. Ct. 873, 888 (2012) (“Evidence from the founding, moreover, suggests that inducing *dissemination*—as opposed to creation—was viewed as an appropriate means to promote science.” (citing Thomas B. Nachbar, *Constructing Copyright’s Mythology*, 6 GREEN BAG 2d 37, 44 (2002))).

203. See Bridy, *supra* note 114, at 21–22.

204. *Id.* at 21 (“The law as it is currently configured cannot vest ownership of the copyright in a procedurally generated work in the work’s author-in-fact, because the work’s author-in-fact—a generative software program—has no legal personhood.”).

205. *Id.* at 26.

206. See Samuelson, *supra* note 137, at 1207.

or licensees of the software for a share of ownership or royalties attributable to works generated by the software.²⁰⁷ A further difficulty with declaring the programmer to be the owner of works produced by the software is the simple fact that, absent a contractual reporting obligation imposed on the users of the software, the programmer will often be unaware of the very existence of such works.²⁰⁸ Ownership in the user rather than the programmer thus seems preferable on both practical and policy grounds.²⁰⁹

Recognizing computer users as the authors and owners of computer-generated works has an additional advantage. It eliminates the necessity of pursuing an elusive distinction between computer-assisted and computer-generated works. Ever since the first reference to computers and copyright by the Register of Copyrights in 1966,²¹⁰ it has been clear that a user who employs a computer merely to assist in the manipulation and presentation of the user's own expression is the author and copyright owner of the resulting work.²¹¹ If computer-generated works, on the other hand, are owned by someone other than the user of the computer—or are not copyrightable at all—it becomes necessary to distinguish situations where the computer is merely a tool of a human creator from those where the computer is itself the creator. This is an obviously difficult, indeed indeterminate, and ultimately pointless endeavor. At the very least it demands a detailed inquiry into the nature of the interaction between the user and the computer and a sophisticated understanding of the functioning and capabilities of the software program. Returning to the analogy of the "voices" cases, it requires courts to decide whether the works actually do emanate from the spirit voice rather than the human intermediary—a decision that

207. See 1 GOLDSTEIN, *supra* note 90, § 2.2.2, at 2:26 ("Contract arrangements between the copyright owner of a computer program and those who use the program to create new works can be relied upon to allocate rights in the works created.").

208. See Samuelson, *supra* note 137, at 1208.

209. An exception to ownership by users rather than programmers is clearly appropriate if the programmer has contributed actual expression that appears in the resulting works. See Samuelson, *supra* note 137, at 1192 ("The only exception to this rule should be for instances in which the work generated by a computer incorporates a substantial block of recognizable expression from the copyrighted program."). The video game cases are an obvious example. See, e.g., *Midway Mfg. Co. v. Artic Int'l, Inc.*, 704 F.2d 1009, 1011-12 (7th Cir. 1983) (holding that involvement of the player does not undermine copyright claim of the game developer).

210. See U.S. COPYRIGHT OFFICE, *supra* note 81, at 5.

211. See FINAL REPORT, *supra* note 93, at 45 ("The eligibility of any work for protection by copyright depends not upon the device or devices used in its creation, but rather upon the presence of at least minimal human creative effort at the time the work is produced.").

courts in those cases have unsurprisingly struggled to avoid.²¹²

Cases from foreign jurisdictions illustrate the difficulty and inefficiency of distinguishing computer-assisted from computer-generated works. In Australia, where computer-generated works are barred from copyright, the Federal Court of Australia was forced to construct an elaborate analysis of the computerized process used to produce the plaintiffs' telephone directories, ultimately holding that the automated procedure was fatal to copyright.²¹³ The result turned, according to one justice, on whether "the person controlling the program can be seen as directing or fashioning the material form of the work."²¹⁴ That case and others prompted an Australian commentator to lament "[the] strict and probably undesirable divide between human-authored and computer-generated works, with copyright protection for the former but none for the latter."²¹⁵ Statutes in some of the countries that expressly extend copyright to computer-generated works mandate a shorter duration of copyright for such works and preclude the authors from asserting so-called "moral rights" in the works—the right to be identified as the author and the right to protect the integrity of the

212. See *supra* text accompanying notes 159–90. The Copyright Office's insistence on human authorship, however, requires it to distinguish between claims based on works "created by divine or supernatural beings" and works "inspired by a divine spirit." COMPENDIUM, *supra* note 85, § 313.2.

213. *Telstra Corp. v Phone Directories Co.* [2010] FCR 142, 178–79 (Austl.). The United States Supreme Court had earlier analyzed the copyrightability of a telephone directory in *Feist Publications, Inc. v. Rural Telephone Service Co.*, 499 U.S. 340, 363–64 (1991), without even mentioning that the directory had been produced by a computer. See Brief for Petitioner, *Feist Publ'ns., Inc. v. Rural Tel Serv. Co.*, 499 U.S. 340 (1991) (No. 89-1909), 1990 WL 53112, at *11.

214. *Telstra Corp.*, at *178; see also *Acohs Pty Ltd. v Ucorp Pty Ltd.*, [2012] FCR 173, 184 (Austl.).

215. Jani McCutcheon, *The Vanishing Author in Computer-Generated Works: A Critical Analysis of Recent Australian Case Law*, 36 MELB. U. L. REV. 915, 967 (2013). The challenge of maintaining such a distinction was obvious to Professor McCutcheon:

There is a continuum between, at one extreme, "computer-assisted" works, and at the other extreme, autonomously-generated works. The centre of the continuum is broad and includes methods of production with varying degrees of human intervention affecting the form. Depending on the degree of human intervention, the form of the output may be minimally, significantly, or substantially determined by software. Applying the *Phone Directories* formula to most parts of the continuum raises many questions relating to authorship and copyright subsistence.

Id. at 929. A case applying South African law prior to its acceptance of copyright in computer-generated works confronted the same distinction between "computer aided" and "computer generated" works in determining the copyrightability of computerized product codes, ultimately finding sufficient human authorship. See *Payen Components S. Afr. Ltd. v. Bovic Gaskets* 1995 (4) SA 441 (CC) at 13–14, 19 (S. Afr.).

work by objecting to derogatory alterations.²¹⁶ This necessitates that “computer-generated” works be specifically defined, typically as a work “generated by [a] computer in circumstances such that there is no human author of the work,”²¹⁷ thus resurrecting the need to distinguish “computer-assisted” from “computer-generated.” Except for works made for hire, United States law has consistently provided the same duration of copyright to all works,²¹⁸ and with a small exception for certain works of visual art,²¹⁹ it has refused to codify protection for “moral rights.” Thus, there is no need under U.S. law to define and distinguish a separate category of “computer-generated works” for these purposes.

V. CONCLUSIONS

Computers create. They write, draw, paint, and compose music. Is their output copyrightable? The law requires an identifiable human author because authors own copyrights and at least for now computers do not possess the personhood necessary to own property. The Copyright Office and some courts and commentators go further, requiring for copyright not only an identifiable human author, but human authorship as well. They demand that the copyrightable expression in a work emanate from a human being. If a person uses a computer to assist in the manipulation and fixation of expression created by the user, the result is copyrightable. However, if a user's interaction with a computer prompts it to generate its *own* expression, the result is excluded from copyright. This is a tenuous and ultimately unnecessary and counter-productive distinction. It denies the incentive of copyright to an increasingly large group of works that are indistinguishable in substance and public value from works created by human beings.

The copyright statute does not define “author” and the constitutional interpretation of that concept is sufficiently broad to include a human being who originates the creation of a work. A computer user who initiates the creation of computer-generated

216. *E.g.*, Copyright, Designs and Patents Act 1988, c. 48, §§ 12, 79, 81 (Eng.); Copyright Ordinance, (1997) Cap. 528, §§ 17(6), 91(2), 93(2) (H.K.); Copyright and Related Rights Act 2000 (Act No. 28/2000) § 30 (Ir.); Copyright Act of 1994 ss 22(2), 97(2), 100(2) (N.Z.)(7),(2),(2).

217. *E.g.*, Copyright, Designs and Patents Act 1988, c. 48, § 178 (Eng.); Copyright Ordinance, (1997) Cap. 528, § 198 (H.K.); Copyright Act of 1994, s 2(1) (N.Z.); *cf.* Copyright and Related Rights Act, 2000 (Act No. 28/2000) § 2 (Ir.) (“generated by computer in circumstances where the author of the work is not an individual”).

218. *See* 17 U.S.C. § 302(a), (c) (2012).

219. *See id.* §§ 101 (definition of “work of visual art”), 106A.

expression should be recognized as the author and copyright owner of the resulting work. A number of foreign countries have already taken this step. The United States, either by judicial decision or statutory amendment, should join them.
