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Coding Creativity: Copyright and the Artificially Intelligent Author

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BRUTUS is Vulcan through and through, utterly devoid of emotion, but he nonetheless seems to have within his reach things that touch not only our minds, but our hearts.
– Selmer Bringsjord, programmer of BRUTUS[1]

ABSTRACT

¶1 For more than a quarter century, interest among copyright scholars in the question of AI authorship has waxed and waned as the popular conversation about AI has oscillated between

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[1] SELMER BRINGSJORD & DAVID A. FERRUCCI, ARTIFICIAL INTELLIGENCE AND LITERARY CREATIVITY: INSIDE THE MIND OF BRUTUS, A STORYTELLING MACHINE xxvi (2000).

exaggerated predictions for its future and premature pronouncements of its death. For policymakers, the issue has sat on the horizon, always within view but never actually pressing. To recognize this fact, however, is not to say that we can or should ignore the challenge that AI authorship presents to copyright law's underlying assumptions about creativity. On the contrary, the relatively slow development of AI offers a reprieve from the reactive, crisis-driven model of policymaking that has dominated copyright law in the digital era.

¶2 By engaging and extending insights from two relatively discrete lines of existing scholarship—the postmodern critique of romantic authorship and the more pragmatic literature on copyright in works produced with the aid of computers—this Article seeks to answer the vexing copyright questions that attend the artificially intelligent production of cultural works. It does so by developing the argument that all creativity is inherently algorithmic and that works produced autonomously by computers are therefore less heterogeneous to both their human counterparts and existing copyright doctrine than appearances may at first suggest.

INTRODUCTION

¶3 The PC revolution of the 1980s caused a seismic, permanent shift in consumer attitudes and practices concerning the reproduction of copyrighted works. The Internet revolution of the 1990s had the same effect with respect to the distribution of those works. As any witness to the head-on collision between intellectual property rights and digital technology will attest, these two shifts have exerted extreme pressure on the existing legal infrastructure for protecting and enforcing copyrights. While this crumbling infrastructure has been propped up by both statutory and technological buttresses designed to curb the unauthorized copying and distribution of digital content, few on either side of the "copyfights" would argue that the system is not broken, and many believe it is irretrievably so.[2]

¶4 This Article is about the copyright consequences of a third computer-enabled technological shift—in the means of creative and artistic production. It is not about the "remix" culture or the ways in which *computers are enabling people* to produce art and other creative works in new ways. That ground has already been covered extraordinarily well by others.[3] It is, instead, about the ways in which *people are enabling computers* to produce art and other creative works in new ways, virtually all by themselves. Although the first putatively computer-authored work was presented for copyright registration sometime before 1965, prompting the Register of Copyrights to voice concern over the indeterminate legal status of works created with the aid of computers,[4] the problem of how to treat works created relatively autonomously by machines has not become a pressing one since then. The delay can be attributed in large part to slower-than-predicted progress in the development of artificial intelligence (AI).[5]

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[2] *See, e.g.*, JAMES BOYLE, THE PUBLIC DOMAIN: ENCLOSING THE COMMONS OF THE MIND 15 (2008) ("Copyright, intended to be the servant of creativity, a means of promoting access to information, is becoming an obstacle to both."); LAWRENCE LESSIG, FREE CULTURE 173 (2004) (asserting that "copyright has become unbalanced, tilted toward an extreme"); JESSICA LITMAN, DIGITAL COPYRIGHT 112 (2001) (characterizing our current copyright law as "complicated, arcane, and counterintuitive"); Lydia Pallas Loren, *Untangling the Web of Music Copyrights*, 53 CASE W. RES. L. REV. 673, 674 (2003) ("The copyright system is broken. Merely retooling it will not work. What is needed is a redesign."); Pamela Samuelson, *Preliminary Thoughts on Copyright Reform*, 3 UTAH L. REV. 551, 555 (2007) (arguing that we need "a simpler copyright law . . . to provide a comprehensible normative framework for all of us who create, use, and disseminate works of authorship").

[3] *See, e.g.*, BOYLE, *supra* note 2, at 122-59; LAWRENCE LESSIG, REMIX 51-83 (2008); JOHN PALFREY & URS GASSER, BORN DIGITAL 111-29 (2008).

[4] *See* REGISTER OF COPYRIGHTS, SIXTY-EIGHTH ANNUAL REP. OF THE REGISTER OF COPYRIGHTS 5 (1966).

[5] Expectations for rapid development of an artificial general intelligence (AGI) in the 1960s and 1970s turned out to be unrealistically inflated, which led to a dwindling of interest in and funding for AI research the 1980s. Patrick Tucker, *The AI Chasers*, THE FUTURIST, Mar.-Apr. 2008, at 15. Lately, the field has become revitalized, and "narrow AIs," dedicated to performing specific tasks, are increasingly a part of daily life. *Id.* These programs operate mostly invisibly to the public, managing urban vehicle traffic and corporate supply chains, automating the delivery of electricity and the trading of stocks. *Id.* Many experts continue to believe that an AGI is on the horizon, but they have become more cautious in their predictions about the timing. *See* J. STORRS HALL, BEYOND AI 35 (2007) ("It is a virtual certainty that AI is coming . . . . The only serious question is timing: will we have general human-level AI in eighty, forty, twenty, or ten years?"). Narrow AIs that generate art, literature, music, and audiovisual works are now in wide enough circulation that the time is upon us to consider their relationship to copyrights and the legal

¶5 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. The generative art movement, for example, is dedicated to the exploration of "computational creativity" through a set of creative practices whereby the artist "cedes control to a system" that is "self-contained enough to operate autonomously."[6] In the realm of computer gaming, the increasingly sophisticated technology of procedural content generation (PCG) has enabled real time, in-game production of highly detailed virtual landscapes and cityscapes—displays that were once designed by hand.[7] Developments like these put an algorithmic twist on the postmodern "death of the author" and lead to difficult questions of authorship, including how and when the law of copyrights should evolve—if, indeed, it can evolve within constitutional limits—to accommodate the birth of artificially intelligent authors.

¶6 This Article seeks to answer these questions, primarily by interrogating longstanding legal and philosophical assumptions about the nature and sources of creativity. Part I considers the requirement of authorship as a constitutional limit on the scope of copyrightable subject matter. It begins with a discussion of romantic authorship as the foundational principle for copyright and moves on to consider the co-evolution of technologies for cultural production and the legal constructs of authorship, originality, and creativity. Part II traces the relationship between computational creativity and human creativity, arguing for a significant kinship between the two that proponents of AI embrace and skeptics reject. Part III takes up the legal question of whether AI authors can be authors within the current frame of copyright law. Finally, Part IV grapples with the thorny ownership issues that flow from embracing the products of generative code as copyrightable works. Although the Article is not concerned first and foremost with producing a doctrinal solution to the ownership problem, Part IV concludes that the work made for hire doctrine is a sound mechanism for vesting ownership of copyrights in AI authored works.

I. THE LEGAL LIMITS OF "AUTHORSHIP"

¶7 Copyright scholars working across the fields of law and literature have written at length on the close relationship between legal and literary constructions of "authorship." [8] These scholars have mapped, in Peter Jaszi's words, "the ways in which the cultural figuration of the 'author,' as the inspired creator of works of art, has interacted with the legal notion of the 'author' as the bearer of

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construction of authorship on which copyrights depend. Some examples of these programs are discussed *infra* in Part II.

[6] Philip Galanter, *Thoughts on Computational Creativity*, DAGSTUHL RESEARCH ONLINE PUBLICATION SERVER 2 (July 7, 2009) http://drops.dagstuhl.de/opus/volltexte/2009/2193/.

The term "generative art," as Galanter uses it, is methodological and not substantive or stylistic. *See* Philip Galanter, *What is Generative Art?: Complexity Theory as a Context for Art Theory*, PHILIP GALANTER 4 (2003), http://philipgalanter.com/downloads/ga2003_paper.pdf. It is also, in Galanter's formulation, "uncoupled from any particular technology," so it doesn't necessarily involve computers. *Id.* The term is commonly understood, however, to denote autonomous or semi-autonomous cultural production *by computers*. *See* Margaret A. Boden & Ernest A. Edmonds, *What is Generative Art?*, 20 DIGITAL CREATIVITY 21, 24 (2009) (explaining that "[b]oth in music and in visual art, the use of the term has now converged on work that has been produced by the activation of a set of rules *and* where the artist lets a computer system take over at least some of the decision-making (although, of course, the artist determines the rules)") (emphasis in original).

[7] PCG has been used since the early days of computer gaming. *See* Noel Llopis, *Procedural Content Creation*, GAME DEVELOPER, Aug. 2009, at 41. The term refers to the automatic creation of game content (e.g., game levels, art assets, narratives, and characters) through the use of algorithms. *See* Julian Togelius et al., *Search-Based Procedural Content Generation*, *in* APPLICATIONS OF EVOLUTIONARY COMPUTATION 142 (C. DiChio et al. eds. 2010). The virtues of PCG from a game publisher's point of view are many: procedurally generated content (1) saves memory, because it can be compressed until needed; (2) saves money, because it eliminates the need for manual production of game content; (3) creates the possibility for endless games with nearly infinite replay value; and (4) augments human imagination and can inspire game designers to create new kinds of content and narratives. *See id.* at 141-42.

[8] *See* MARK ROSE, AUTHORS AND OWNERS: THE INVENTION OF COPYRIGHT (1993); Peter Jaszi, *On the Author Effect: Contemporary Copyright and Collective Creativity*, 10 CARDOZO ARTS & ENT. L.J. 293 (1992) [hereinafter Jaszi, *On the Author Effect*]; Peter Jaszi, *Toward a Theory of Copyright: The Metamorphoses of "Authorship,"* 1991 DUKE L.J. 455 (1991); Mark Rose, *The Author as Proprietor:* Donaldson v. Becket *and the Genealogy of Modern Authorship*, 23 REPRESENTATIONS 51 (1988); Martha Woodmansee, *On the Author Effect: Recovering Collectivity*, 10 CARDOZO ARTS & ENT. L.J. 279 (1992) [hereinafter Woodmansee, *On the Author Effect*]; Martha Woodmansee, *The Genius and the Copyright: Economic and Legal Conditions of the Emergence of the "Author,"* 17 EIGHTEENTH-CENTURY STUDIES 425 (1984).

portable rights in literary and artistic property."[9] The rich cross-disciplinary body of scholarly work on authorship, most of which dates from the early 1990s, was inspired by the writings of Roland Barthes and Michel Foucault, whose poststructuralist critiques of authorship sought to expose as historically and culturally contingent the idea of the author as an individual creative personality, a solitary originator of stylistically consistent works.[10] Referencing the work of Foucault and drawing to varying degrees on his insights about the role of the "author function" in the attribution and ownership of literary texts, Jaszi, Martha Woodmansee, and Mark Rose have each argued persuasively that the figure of the romantic author sits monolithically at the core of copyright law, obscuring important realities about the collective nature of creativity and misrepresenting the actual processes of cultural production—both past and present.[11] To quote James Boyle, who argues in the same vein, the individualized figure of the romantic author "blinds us to the pragmatic, moral, and distributive claims of both 'sources' and audience" when it comes to the regulation of information products.[12]

¶8 To understand how the romantic author came to occupy this privileged and monolithic position, one must return to the English origins of the copyright and its rather seamless integration into the legal framework of the early American republic. When the framers of the Constitution delegated to Congress the power to grant exclusive rights to "Authors and Inventors" in "their respective Writings and Discoveries," they had for a model England's Statute of Anne, in which the literary notion of the author as originator merged with Locke's economic theory of possessive individualism to produce the legal construct of the author as proprietor.[13] The influence of this individualistic and proprietary understanding of authorship on the framers is evident in Federalist 43, in which James Madison approvingly invoked the English copyright system and its support for personal ownership of creative and inventive works.[14] Madison appears to have thought it self-evident that England's recognition of individual rights in authors and inventors was logically sound, publicly beneficial, and therefore worth replicating.[15] From 1790, the year in which Congress enacted the first copyright statute, the defining question of U.S. copyright law has been how far the Constitution permits Congress to go in protecting the "Writings" of "Authors." In early cases testing the constitutional

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[9] Jaszi, *On the Author Effect*, *supra* note 8, at 294.

[10] *See* ROLAND BARTHES, IMAGE-MUSIC-TEXT 142-43 (1977) ("The author is a modern figure, a product of our society insofar as, emerging from the Middle Ages with English empiricism, French rationalism and the personal faith of the Reformation, it discovered the prestige of the individual, of, as it is more nobly put, the 'human person.'"); MICHEL FOUCAULT, THE FOUCAULT READER 101 (1984) ("The coming into being of the notion of 'author' constitutes the privileged moment of *individualization* in the history of ideas, knowledge, literature, philosophy and the sciences.") (emphasis in original).

[11] *See* ROSE, *supra* note 8, at 3 ("Copyright is founded on the concept of the unique individual who creates something original and is entitled to reap a profit from those labors. Until recently, the dominant modes of aesthetic thinking have shared the romantic and individualistic assumptions inscribed in copyright. But these assumptions obscure important truths about the processes of cultural production."); Jaszi, *The Author Effect*, *supra* note 8, at 295 ("[T]he persistence of the notion of 'authorship' in American copyright law makes it difficult for any new legal synthesis, which would focus on the reality of collective creativity, to emerge."); Woodmansee, *On the Author Effect*, *supra* note 8, at 292 ("[T]he law has yet to be affected by the 'critique of authorship' initiated by Foucault. . . . [I]t would seem that as creative production becomes more corporate, collective, and collaborative, the law invokes the Romantic author all the more insistently.").

[12] James Boyle, *A Theory of Law and Information: Copyright, Spleens, Blackmail, and Insider Trading*, 80 CAL. L. REV. 1413, 1423 (1992). In an earlier article, Boyle elegantly describes Foucault's "author" as "the principle of thrift in the production of meaning, a device that limits and disciplines the range of meanings to be found in the text." James Boyle, *The Search for an Author: Shakespeare and the Framers*, 37 AM. U. L. REV. 625, 626 (1988).

[13] *See* ROSE, *supra* note 8, at 56. Rose locates the formation of the construct of the author as proprietor at the nexus of three historical phenomena: the emergence in England of a mass market for books; the valorization of the individual genius, as reflected in the writings of Samuel Johnson and others; and the development of Locke's philosophy of possessive individualism. *Id.* As Diane Leenheer Zimmerman points out, the Statute of Anne vests copyright in the first instance in authors, but it takes account of the interests of many parties, including printers and booksellers. *See* Diane Leenheer Zimmerman, *It's an Original!(?): In Pursuit of Copyright's Elusive Essence*, 28 COLUM. J.L. & ARTS 187, 194 (2005). At the time of the Statute's adoption, the realities of the publishing trade were such that authors did not control publication of their own works and usually signed away their rights before publication, which was the moment at which copyright attached. *Id.* Zimmerman's analysis of the Statute of Anne against the backdrop of existing trade practices suggests that the landmark legislation made authors proprietors of their works more in theory than in practice. *See id.* (arguing that the presence of authors in the statute was largely for rhetorical purposes).

[14] THE FEDERALIST NO. 43 (James Madison) (1788) ("The copyright of authors has been solemnly adjudged, in Great Britain, to be a right of common law. The right to useful inventions seems with equal reason to belong to the inventors. The public good fully coincides in both cases with the claims of individuals.").

[15] *Id.*

limits of the Congressional power, that question tended to decompose into two separate but related constitutional inquiries: Who can be counted as an author, and what can be counted as a writing?

¶9 Since the days of the *Trade-Mark Cases*,[16] when works covered by the Copyright Act were expressly limited to specific categories,[17] courts have liberally construed both terms. In doing so, they have consistently formulated the threshold requirements for authorship in terms of mind and intellect. For example, the Supreme Court in the *Trade-Mark Cases* limited "writings" to "only such as are original, and are founded in the creative powers of the mind."[18] Unlike the symbols that can constitute trademarks, the Court explained, works eligible for copyright protection are limited to "the fruits of intellectual labor" and "depend upon work of the brain."[19]

¶10 In *Burrow-Giles Lithographic Co. v. Sarony*, the Court considered the constitutionality of extending copyright protection to photographs, which were, to a certain way of thinking, purely mechanical reproductions of their subjects, lacking the requisites of originality and creativity established in the *Trade-Mark Cases*.[20] Burrow-Giles argued in the case that Napoleon Sarony's photograph of Oscar Wilde was neither a writing nor the production of an author—an argument to which the Court, inclined to give both terms a broad meaning, was unreceptive.[21] The Court defined authorship and copyright in broadly humanistic terms, citing the Framers' reliance on English law: an author is "he to whom anything owes it origin; originator; maker; one who completes a work of science or literature;" copyright is "the exclusive right of a man to the production of his own genius or intellect."[22] Authorship could also be understood, the Court concluded, in terms of causation: the author is "the cause of the picture" and "the man who…gives effect to the idea, fancy, or imagination."[23] The camera took the photo, but the composition originated with the person behind the camera.[24] As the originator of the photograph, the motive force without which it could not have come into existence, the photographer was held to be an author for copyright purposes, regardless of his reliance on a machine.[25]

¶11 According to the Court's reasoning in *Burrow-Giles*, the machine taking the picture mediated but neither negated nor co-opted the process of artistic production, which could be traced quite directly back to the governing consciousness and sensibility of the photographer, the person behind the lens who posed the subject just so and altered the lighting just so.[26] The camera functioned merely as an instrument, a means to the end of realizing the human operator's creative vision, which is the basis for copyright in the resulting photograph.[27] The Court in *Burrow-Giles* expressly declined to decide whether unstaged photographs lacking visible signs of active human intervention in their composition could properly be regarded as having been authored for copyright purposes, but it

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[16] Trade-Mark Cases, 100 U.S. 82 (1879).

[17] *Id.* at 94-96.

[18] *Id.* at 94.

[19] *Id.*

[20] *See* Burrow-Giles Lithographic Co. v. Sarony, 111 U.S. 53, 58-59 (1884) ("But it is said that . . . the photograph is the mere mechanical reproduction of the physical features or outlines of some object . . . and involves no originality of thought or any novelty in the intellectual operation connected with its visible reproduction in shape of a picture.").

[21] *Id.* at 56 ("It is insisted in argument, that a photograph being a reproduction on paper of the exact features of some natural object or of some person, is not a writing of which the producer is the author.").

[22] *Id.* at 57-58.

[23] *Id.* at 61. The authorship-as-causation formulation recurs in later cases. *See, e.g.*, Remick Music Corp. v. Interstate Hotel Co., 58 F. Supp. 523, 531 (D. Nebr. 1944) ("Thus the term 'author' is defined as 'the beginner . . . or first mover of anything; hence, efficient cause of a thing . . . .'") (citing WEBSTER'S NEW INTERNATIONAL DICTIONARY (1st. ed. 1925)).

[24] *Burrow-Giles*, 111 U.S. at 61.

[25] *Id.*

[26] *See id.*

[27] Christine Haight Farley situates *Burrow-Giles* in the context of the early history of photography—an exercise that reveals how easily the case could have gone the other way in light of the rhetoric that camera manufacturers and early adopters used to explain (and market) the seemingly miraculous new invention to the public. *See* Christine Haight Farley, *The Lingering Effects of Copyright's Response to the Invention of Photography*, 65 U. PITT. L. REV. 385, 389 (2004) ("When photography was first invented, it was explicitly promoted as being a mechanical science whereby the machine was able to produce a direct transcription of the scene before it. It was argued that the image was not mediated by the human operator of the machine—it was produced directly by the technology.").

suggested in dicta that they could not.[28] This dicta laid the groundwork for a dichotomy between creative and mechanical labor that appears frequently in later cases, both those that actually involve machine-mediated cultural production and those that do not.[29] It also helped to establish a tacit, powerful, and persistent assumption in the law of copyrights that automation is antithetical to authorship.

¶12 In *Bleistein v. Donaldson Lithographing Co.*,[30] the Court augmented its early jurisprudence of authorship, but departed from the developing focus on creativity and genius. Writing for the Court, Justice Holmes offered a conception of authorship grounded in the inherent uniqueness of human personality: "The copy is the personal reaction of an individual upon nature. Personality always contains something unique. . . . something irreducible, which is one man's alone. That something he may copyright."[31] Even as this more modest conception of authorship-as-personality dispenses with the language of genius and intellect, it reinforces the individualization of authorship and the human element on which the court insisted in *Burrow-Giles*. From *Burrow-Giles* to *Bleistein*, one can trace an evolution—or, perhaps, devolution—in the legal construction of authorship from genius or artistry to mere personality. Concomitant with this (d)evolution is a retreat from the proposition that judges deciding copyright cases are called upon to make aesthetic judgments about the works in question.[32]

¶13 By opening up the world of copyrights to lowly advertising posters—work that "attracts the crowd"—the Court in *Bleistein* established that originality for copyright purposes does not require a relationship to the fine arts or high culture; it requires only the imprint, however humble, of an individual personality. This democratizing recalibration of the originality standard marks the jurisprudential moment at which copyright protection became virtually guaranteed for any work produced by a human hand, regardless of its perceived creativity or aesthetic merit.[33]

¶14 In later cases applying *Bleistein*, including the Second Circuit's decision in *Alfred Bell & Co. v. Catalda Fine Arts, Inc.* and the Eighth Circuit's in *Anshel v. Puritan Pharmaceutical Co.*, the standard for originality in copyright law reached a low watermark: "The artistic work must be 'original,' but this means no more than that the work must not be copied from another artistic work of the same character."[34] In *Bell*, the court held that "original" for copyright purposes does *not* mean "startling, novel or unusual, a marked departure from the past."[35] A creative standard that high is reserved, the

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[28] *Burrow-Giles*, 111 U.S. at 59; *see also* Meshwerks, Inc. v. Toyota Motor Sales U.S.A., Inc., 528 F.3d 1258, 1263 n.5 (10th Cir. 2008) (asserting that photographs are not per se copyrightable). *But see* Jewelers' Circular Pub. Co. v. Keystone Pub. Co., 274 F. 932, 934-935 (D.C.N.Y. 1921) ("[N]o photograph, however simple, can be unaffected by the personal influence of the author, and no two will be absolutely alike. . . . The suggestion that the Constitution might not include all photographs seems to me overstrained.").

[29] *See* Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 362 (1991) (stating that "the selection and arrangement of facts cannot be so mechanical or routine as to require no creativity whatsoever"); Southco, Inc. v. Kanebridge Corp., 390 F.3d 276, 284-285 (3d Cir. 2004) ("hold[ing] that the Southco part numbers are not protected by copyright because they are mechanically produced by the inflexible rules of the Southco system); Courier Lithographing Co. v. Donaldson Lithographing Co. 104 F. 993, 995 (6th Cir. 1900) (stating that "a photograph might be something more than a mere mechanical and chemical product, and might rise to the dignity of art, through the blending of the mechanical parts of the process with the original intellectual conceptions of an artist"); Shapiro, Bernstein & Co. v. Miracle Record Co., 91 F. Supp. 473, 474 (D. Ill.1950) (stating that "the purpose of the copyright law is to protect creation, not mechanical skill"); Arnstein v. Edward B. Marks Music Corp., 11 F. Supp. 535, 536 (S.D.N.Y. 1935) (referencing patent law standards and distinguishing between "an exercise of inventive genius" and "mere mechanical skill").

Even before *Burrow-Giles*, the dichotomy between the creative and the mechanical appeared in copyright cases. *See* Daly v. Palmer, 6 F. Cas. 1132, 1137 (C.C.N.Y. 1868) ("The original air requires the aid of genius for its construction, but a mere mechanic in music can make the adaptation or accompaniment.").

[30] Bleistein v. Donaldson Lithographing Co., 188 U.S. 239 (1903).

[31] *Id.* at 250.

[32] *See id.* at 251 ("It would be a dangerous undertaking for persons trained only to the law to constitute themselves final judges of the worth of pictorial illustrations . . . .").

[33] To use Zimmerman's words, the originality standard in *Bleistein* and its progeny "was reduced to such a state of feebleness that failing to find it was aberrational." Zimmerman, *supra* note 13, at 204.

[34] Ansehl v. Puritan Pharm. Co., 61 F.2d 131, 136 (8th Cir. 1932) (quoting W.A. Copinger, LAW OF COPYRIGHT 75 (6th ed. 1927)); *see also* Alfred Bell & Co. v. Catalda Fine Arts, Inc., 191 F.2d 99, 106 n.13 (2d Cir. 1951) (quoting W.A. Copinger, Law of Copyright 40-44 (7th ed. 1936)).

[35] *Bell*, 191 F.2d at 102.

court said, for patent law.[36] "Original" in copyright law means only that "the particular work 'owes it origin' to the 'author.'"[37] On this reading, "original" is more a designation of source than it is a metric of creativity.

¶15 Notably absent from these post-*Bleistein* decisions are words like "genius," "intellect," "fancy," and "imagination," which functioned as synonyms for authorship in *Burrow-Giles*. Further divorcing the concepts of originality and authorship from the notion of purposive creativity, the court in *Bell* held that even unintentional or accidental variations (e.g., "a shock caused by a clap of thunder") may be claimed by an author as his or her own, as long as those variations are more than merely trivial.[38] Sidestepping the usual talk of genius and imagination, these cases avoid the focus on creative intention that was well established in the earlier case law.

¶16 Other courts, however, continued to insist on something more than independent creation to justify copyright. In *Baltimore Orioles, Inc. v. Major League Baseball Players Association*,[39] the Seventh Circuit sought to clarify that originality *qua* lack of copying is not sufficient to make a work an "original work of authorship" for copyright purposes:

> It is important to distinguish among three separate concepts—originality, creativity, and novelty. A work is original if it is the independent creation of its author. A work is creative if it embodies some modest amount of intellectual labor. A work is novel if it differs from existing works in some relevant respect. For a work to be copyrightable, it must be original and creative, but need not be novel. (Thus, in contrast to patent law, a work that is independently produced by two separate authors may be copyrighted by both.). . . Although the requirements of independent creation and intellectual labor both flow from the constitutional prerequisite of authorship and the statutory reference to original works of authorship, courts often engender confusion by referring to both concepts by the term "originality." For the sake of clarity, we shall use "originality" to mean independent authorship and "creativity" to denote intellectual labor.[40]

¶17 The Seventh Circuit here echoes *Bell*'s conclusion that novelty in the patent sense is not required in copyright law; however, the court pointedly teases apart the concepts of originality and creativity, thus departing from *Bell*'s unitary focus on originality and its conflation of two discrete constitutional requirements into a single criterion.

¶18 The task of giving more definite shape to the nebulous (and nebulously related) concepts of authorship, creativity, and originality fell ultimately to the Supreme Court in *Feist Publications, Inc. v. Rural Telephone Service Co.*[41] In *Feist*, the Court was asked to decide whether the white pages of a telephone directory were an "original work of authorship" for statutory purposes. By this time, creativity had come to occupy an uncertain place in the copyright inquiry. Did it matter at all in the analysis? If so, what did it mean? Helpfully, the Court in *Feist* answered the first question in the affirmative: "As a constitutional matter, copyright protects only those constituent elements of a work that possess more than a *de minimis* quantum of creativity."[42] Unhelpfully, however, the Court was less than forthcoming on the second question. Readers of the opinion are left to cobble together a definition of creativity from the Court's scattered observations about Rural's authorial failings. For example, the opinion tells us that Rural's alphabetizing the surnames of its subscribers could not sustain a copyright because that method of selecting and organizing information "could not be more obvious."[43] Additionally, the Court said, the organization of Rural's white pages was "garden-

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[36] *Id.*

[37] *Id.*

[38] *Id.* at 102-03.

[39] Baltimore Orioles, Inc. v. Major League Baseball Players Ass'n, 805 F.2d 663 (7th Cir. 1986).

[40] *Id.* at 668 n.6.

[41] Feist Publ'ns., Inc. v. Rural Tel. Serv. Co., 499 U.S. 340 (1991).

[42] *Id.* at 363.

[43] *Id.* at 362.

variety," "entirely typical," "firmly rooted in tradition," and "commonplace."[44] From these statements, one might infer that obviousness is fatal to statutory protection, much as it is in patent law, but the Court says elsewhere in the opinion that the "spark of creativity" required for copyright can actually be "crude, humble or obvious."[45]

¶19 In other places in the opinion, the Court's guidance about the meaning of creativity seems equally equivocal, and the concepts of originality and creativity—which the Seventh Circuit in *Baltimore Orioles* was at pains to keep distinct—are conflated: "As mentioned, originality is not a stringent standard; it does not require that facts be presented in an innovative or surprising way. It is equally true, however, that the selection and arrangement of facts cannot be so mechanical or routine as to require no creativity whatsoever."[46] Such statements, which are concerned more with what creativity is *not* than with what it is, make it virtually impossible to discern from *Feist* where on the spectrum between the surprising and the routine to locate the break between eligible and ineligible subject matter. Given the logic of the opinion, the line must certainly be drawn much closer to routine than to surprise, but how close it can get to routine before the necessary "spark of creativity" is extinguished is anyone's guess. *Feist*'s unequivocal rejection of the routine and the mechanical does, however, implicitly place the work that machines do beyond the copyright pale, reinforcing the longstanding assumption from *Burrow-Giles* that purely mechanical labor is *per se* not creative.

¶20 Perhaps the least equivocal statement *Feist* makes about the nature of creativity comes in the form of a quote from *Burrow-Giles*: "[A]n author who claims infringement must prove 'the existence of…intellectual production, of thought, and conception.'"[47] The Court's invocation of intellectual labor, harking back to the *Trade-Mark Cases*, logically grounds *Feist*'s repudiation of cases holding that "sweat of the brow" or "industrious collection" will sustain a copyright.[48] It is thus not enough, contrary to *Bell*, for a work to be original only in the sense that is was not copied from another work. The Court makes at least that much clear by casting creativity as a necessary (even if ultimately ineffable) component of originality.[49] The quote from *Burrow-Giles* implies, too, that creativity must be purposive or intentional; it can't be accidental or externally motivated, like the *Bell* court's hypothetical clap of thunder. Beyond these indistinct outlines, however, *Feist* does not provide much guidance concerning the shape of copyright's creativity requirement. It may be that after *Feist* creativity has become to copyright law what obscenity is to First Amendment law: hard to define, but putatively easy to recognize.[50]

¶21 Copyright scholars have been nearly uniformly critical of the Court's failure in *Feist* to give any real content to the creativity requirement. Leo Raskind has written of *Feist*'s devaluation of the authorship component of the copyright analysis and of the opinion's undue focus on the requirement of originality.[51] Diane Lenheer Zimmerman faults the Court for failing to articulate an originality standard with any teeth, even as it demands something more of copyright claimants than sweat of the brow.[52] Michael Madison argues that copyright's creativity standard has become so empty after *Feist*, and excludes so little as a practical matter, that it would be more productive to put it to one side,

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[44] *Id.* at 362.

[45] *Id.* at 345.

[46] *Id.* at 362.

[47] *Id.* at 362 (quoting Burrow-Giles Lithographic Co. v. Sarony, 111 U.S. 53, 59-60 (1884)).

[48] *See id.* at 352-56 (explaining why the industrious collection rationale violates the Constitution's originality mandate).

[49] *See id.* at 348 (stating that "choices as to selection and arrangement, so long as they are made independently by the compiler *and entail a minimum degree of creativity*, are sufficiently original that Congress may protect such compilations through the copyright laws") (emphasis added); *id.* at 358 (stating that "[o]riginality requires only that the author make the selection or arrangement independently (i.e., without copying . . . from another work), *and that it display some minimal level of creativity*") (emphasis added).

[50] The famous saying is from *Jacobellis v. Ohio*:

> I shall not today attempt further to define the kinds of material I understand to be embraced within that shorthand description [i.e., "hard-core pornography"]; and perhaps I could never succeed in intelligibly doing so. But I know it when I see it, and the motion picture involved in this case is not that.

Jacobellis v. Ohio, 378 U.S. 184, 197 (1964) (Stewart, J., concurring).

[51] *See* Leo J. Raskind, *Assessing the Impact of Feist*, 17 U. DAYTON L. REV. 331, 334 (1992).

[52] *See* Zimmerman, *supra* note 13, at 209.

focusing instead on copyright as a mechanism for producing and disseminating knowledge.[53] Asserting that "creativity has exhausted itself conceptually" as an anchor for copyright law, Madison advocates the re-conceptualization of copyright as "knowledge law."[54] Such a wholesale shift in perspective has the potential to redirect the conversation about the purpose and scope of copyright out of the creativity cul-de-sac in which *Feist* has trapped it.[55] At the end of the day, however, creativity after *Feist* is (quite unworkably) both the *sine qua non* and the *je ne sais quoi* of copyright; the opinion makes it all but impossible for courts and advocates to maneuver around it.

II. THE QUESTION OF COMPUTATIONAL CREATIVITY

A. Theorizing Computational Creativity

¶22 Given copyright law's abortive attempt to produce a workable definition of creativity, it should surprise no one that the project has been equally vexed in the fields of artificial intelligence and cognitive psychology. Among researchers in these fields, it is an open and contentious debate whether computers will ever be creative in the sense that humans are creative—whatever that sense is.[56] The answer, of course, depends almost entirely on how creativity is defined, and there is certainly no dearth of competing definitions.[57] If creativity is defined in terms of human consciousness—as it is, always at least implicitly, in much of the copyright case law surveyed in the preceding section—then machines *ex vi termini* will never be able to achieve it, no matter how sophisticated they become.[58] AI skeptics are fond of quoting Ada Lovelace, who, in 1843, cautioned against over-optimism about the potential of Charles Babbage's proposed Analytical Engine:

> It is desirable to guard against the possibility of exaggerated ideas that might arise as to the powers of the Analytical Engine. The Analytical Engine has no pretensions whatever to originate anything. It can do (only) whatever we know how to order it to perform.[59]

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[53] *See* Michael J. Madison, *Beyond Creativity: Copyright as Knowledge Law*, 12 VAND. J. ENT. & TECH. L. 817 (2010).

[54] *Id.* at 831. "Copyright began as knowledge law," Madison contends, "and knowledge law it should remain." *Id.*

[55] Joseph Scott Miller has argued, conversely, that *Feist*'s insistence on creativity represents a "definitive tug upward on originality's *constitutional* minimum" and an opportunity to raise the threshold for copyright protection so that it aligns more closely with patent law's rigorous standards. Joseph Scott Miller, *Hoisting Creativity*, 31 CARDOZO L. REV. 451, 460 (2009). Miller acknowledges, however, that in the wake of *Feist* "a fog remains of the widespread pre-*Feist* belief that originality meant only the absence of copying from another." *Id.* at 461. Indeed, some courts deciding cases after *Feist* have actually ignored the criterion of creativity, focusing exclusively on originality as the absence of copying. *See, e.g.*, Mag Jewelry Co. v. Cherokee, Inc., 496 F.3d 108, 116 (1st Cir. 2007) ("[A] work is original and may command copyright protection, even if it is completely identical with a prior work, provided it was not copied from such prior work but is rather a product of the independent efforts of its author.") (quoting Melville B. Nimmer & David Nimmer, NIMMER ON COPYRIGHT § 2.01[A] (2007)); Ross, Brovins & Oehmke, P.C. v. Lexis Nexis Group, 463 F.3d 478, 485 (6th Cir. 2006) ("Copyright law extends protection to works that are 'independently created by the author (as opposed to copied from other works).'") (citation omitted); Waldman Publishing Corp. v. Landoll, Inc., 43 F.3d 775, 782 (2d Cir. 1994) (quoting Melville B. Nimmer & David Nimmer, NIMMER ON COPYRIGHT § 8.21[E] (2007)). These cases suggest that the "tug upward" on originality in *Feist* (via the criterion of creativity) was less definitive than it could have been.

[56] AI researchers generally fall into two camps: those who believe in "strong AI" and those who believe in only "weak AI." Selmer Bringsjord, *Chess is Too Easy*, TECH. REV., Mar.-Apr. 1998, at 23-24. Believers in strong AI "hold[] that all human thought is completely algorithmic, that is, it can be broken down into a series of mathematical operations." *Id.* at 23. Believers in weak AI subscribe to "the notion that human thought can only be simulated in a computational device." *Id.* at 23-24. Proponents of strong AI believe that "AI engineers will eventually replicate the human mind and create a genuinely self-conscious robot replete with feelings and emotions." *Id.* at 23. Proponents of weak AI are less ambitious and believe that "future robots may exhibit much of the behavior of persons, but none of these robots will ever be a person; their inner life will be as empty as a rock's." *Id.* at 24.

[57] *See* DAVID GELERNTER, THE MUSE IN THE MACHINE 83 (1994) ("Creativity is a fascinating phenomenon and it has been studied endlessly. . . . No master key has been discovered."); Roger Schank & Christopher Owens, *The Mechanics of Creativity*, *in* THE AGE OF INTELLIGENT MACHINES 394 (Raymond Kurzweil ed., 1991) (asserting that "the search for a rigorous philosophical definition of creativity has been overworked"). Calvin W. Taylor, an academic psychologist specializing in creativity research during the 1960s, when AI was a new field, cataloged over fifty definitions of creativity derived from different sources. *See* DAVID LEVY, ROBOTS UNLIMITED: LIFE IN A VIRTUAL AGE 149 (2006).

[58] *See* Schank & Owens, *supra* note 57, at 394 (describing a critique of AI premised on the idea that machines can never really be creative because creativity is "inherently mystical" and defies reduction to rules and procedures).

[59] LEVY, *supra* note 57, at 149 (quoting Lovelace). Babbage, considered by many to be the inventor of the first digital computer, was never able to bring his plans for the Analytical Engine to fruition, and the project remained unexecuted at his death, due at least in part to a lack of venture financing. *See id.* at 11-12. Ada Lovelace, the daughter of Lord Byron, was Babbage's collaborator. *Id.* at 12, n.4. The Ada programming language is named after her. *Id.*

¶23 Notwithstanding its age and the technological advances that have occurred since its utterance, Lovelace's critique remains credible. Even though today's computers are exponentially more powerful than their early ancestors in terms of memory and processing, they still rely on humans in the first instance to dictate the rules according to which they perform. Like the photographer standing behind the camera, an intelligent programmer or team of programmers stands behind every artificially intelligent machine. People create the rules, and machines obediently follow them—doing, in Lovelace's words, only whatever we order them to perform, and nothing more. Lovelace's quote also suggests that it is the rule-bound, deterministic nature of computer behavior that forecloses the possibility of machine creativity. Her logic implies that creativity lies in the ability to do the unpredictable, to deviate from or defy rules, to break from the routine.

¶24 One response to Lovelace's argument is that computers can, in fact, be programmed to produce unexpected results by incorporating elements of randomness into their processing.[60] If we take unpredictability as a proxy for creativity, we can make machines creative by ordering them to behave unpredictably in some of the choices they are coded to make.[61] "The true literature machine," said the avant-garde novelist Italo Calvino, "will be one that itself feels the need to produce disorder, as a reaction against its preceding production of order: a machine that will produce avant-garde work to free its circuits when they are choked with too long a production of classicism."[62] For those committed to the belief that creativity requires human consciousness, however, simply making machines do things that we associate with creativity (e.g., producing disorder or breaking rules) will never be enough to make machines truly creative.[63] Computational creativity, in this view, can never be anything more than an oxymoron, and no proxy for creativity can ever stand in for the "real" thing.[64]

¶25 A more provocative response to Lovelace is that the human brain is something of a machine in its own right—a "meat machine," to borrow an eloquent phrase from the AI pioneer Marvin Minsky.[65] The suggestion is heresy for some.[66] So, too, is Calvino's conclusion that "writers, as they have always been up to now, are already writing machines," processing existing works, extrapolating rules from their examples, and then applying those rules to the task of composition.[67] How is it really

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[60] *See id.* at 150-51.

[61] *See id.* at 151 ("By instructing the computer to employ randomness we are making it creative….The use of randomness breeds creativity because the very process of creativity requires that some decisions be taken for no particular reason."); *see also* DAVID COPE, COMPUTER MODELS OF MUSICAL CREATIVITY 12 (2005) (asserting that programmed randomness produces output that is apparently original much more often than it produces output that is predictable).

[62] ITALO CALVINO, THE USES OF LITERATURE 13 (Patrick Creagh trans. 1982).

[63] *See* BRINGSJORD & FERRUCCI, *supra* note 1, at xvi-xviii (identifying and arguing against proponents of computational creativity).

[64] The most often cited articulation of the AI skeptic's position comes from John Searle, who proposed a thought experiment in which a person who speaks only English sits alone inside a room and manipulates Chinese characters according to instructions given to her in English. Although it appears to someone sitting outside the room that she speaks Chinese, the person inside the room actually understands nothing of the language. The thought experiment is intended to show by analogy that while computers can be programmed to apply linguistic rules correctly, they have no capacity to actually comprehend language. *See* John R. Searle, *Minds, Brains, and Programs*, 3 BEHAVIORAL & BRAIN SCIENCES 417 (1980).

[65] *See* PAMELA MCCORDUCK, MACHINES WHO THINK: A PERSONAL INQUIRY INTO THE HISTORY AND PROSPECTS OF ARTIFICIAL INTELLIGENCE 70 (1979). Ironically enough, as Anne Balsamo and others have pointed out, the term "computer" initially referred to human beings, specifically to female office workers who operated electromechanical (i.e., pre-electronic) calculators. *See, e.g.*, ANNE BALSAMO, TECHNOLOGIES OF THE GENDERED BODY: READING CYBORG WOMEN 133 (1996); N. KATHERINE HAYLES, MY MOTHER WAS A COMPUTER: DIGITAL SUBJECTS AND LITERARY TEXTS 1 (2005).

[66] *See* DOUGLAS HOFSTADTER AND THE FLUID ANALOGIES RESEARCH GROUP, FLUID CONCEPTS & CREATIVE ANALOGIES: COMPUTER MODELS OF THE FUNDAMENTAL MECHANISMS OF THOUGHT 310 (1995) ("People seem to want there to be an absolute threshold between the living and the non-living, and between the thinking and the 'merely mechanical,' and they seem to feel uncomfortable with the thought that there could be 'shadow entities,' such as biological viruses or complex computer programs, that bridge either of these psychologically precious gulfs."); MCCORDUCK, *supra* note 65, at 70 ("People who are scandalized by such a statement take it as one more instance of the generally irreverent, even misanthropic, attitudes that they are convinced pervade artificial-intelligence work.").

[67] Calvino, *supra* note 62, at 15. Calvino contrasts aesthetic theories holding that poetry is "something intuitive, immediate, authentic, and all-embracing that springs up who knows how," with his own experience of writing, which he characterizes (rather less romantically) as "a constant series of attempts to make one word stay put after another by following certain definite rules; or, more often, rules that were neither definite nor definable, but that might be extracted from a series of examples, or rules made up for the occasion—that is to say, derived from the rules followed by other writers." *Id.* The process of writing, as he describes it, is more an exercise in finding and applying rules than in channeling a muse.

plausible, the skeptics wonder, that human creativity could itself be computational or algorithmic?[68] Avant-gardists like Calvino raise the possibility that humans and machines, if we consider the rule-bound nature of their respective outputs and the pre-existing models they are wont to emulate, are really not as different as we are conditioned to believe.[69] Calvino belonged to a still-extant experimental writing group known as Oulipo, an acronym for Ouvroir de Littérature Potentielle (Workshop for Potential Literature).[70]

> Oulipo was founded in 1960 by novelist/mathematician Raymond Queneau and poet/chess master Francois Le Lionnais to explore the possibilities of incorporating mathematical structures into literary creation . . . [O]ulipian invention provides a rigorous investigation of the program as a generative agent in literary work, and its methods provide a useful reference point for considering algorithmic generation of poetry.[71]

¶26 The Oulipian method of writing requires writers to compose under self-imposed external constraints, often based on mathematical equations.[72] Probably the most well known Oulipian work is Georges Perec's *La disparition* (translated as *The Void*), a full-length detective novel written entirely without the letter "e."[73] The chapters of another of Perec's novels, *La Vie mode d'emploi* (translated as *Life: A User's Manual*), are plotted within the layout of an apartment building in Paris to emulate a knight's tour of a chessboard.[74] By creating new literary works within these rigid constraints, Oulipians bring to the fore the dialectical relationship between rules and innovation, determinism and choice that is inherent in all processes of cultural production. Since the founding of Oulipo, similar workshops have come into being to explore human-mediated algorithmic production in the domains of painting (Oupeinpo) and music (Oumupo), for example.[75] In the musical realm, composers throughout history—long before the founding of Oulipo and its offshoots—experimented with algorithmic composition, "buil[ding] stylistic models from constraints, preferences, and procedural descriptions of the act of making a composition."[76] Schoenberg is a famous example; he sometimes required of his compositions that they use the full range of the chromatic scale, and at other times, he avoided or

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[68] *See, e.g.*, Peter Kassan, *AI Gone Awry: The Futile Quest for Artificial Intelligence*, 12 SKEPTIC 30, 34 (2006) ("The way people actually reason can't be reduced to an algorithmic procedure like arithmetic or formal logic.").

[69] *See* Alison James, *Automatism, Arbitrariness, and the Oulipian Author*, 31 FRENCH FORUM 111, at 122 (2006) (arguing that Calvino "divides the process of creation into mechanical and human components, suggesting that the author . . . can work both with and against the automatism of the machine").

[70] *See* LOSS PEQUEÑO GLAZIER, DIGITAL POETICS: THE MAKING OF E-POETRIES 128 (2002). Oulipians would say Calvino "belongs," because membership in Oulipo survives death.

[71] *Id.*

[72] The constraints within which Oulipians write vary in their complexity. For example, Oulipians are known for employing the S+7 method, where each noun in a given text, such as a poem, is systematically replaced by the noun to be found seven places away in a chosen dictionary. *See generally* James, *supra* note 69, at 112-18. Another Oulipian technique for producing poems is to apply the snowball (boule de neige) constraint: each line of the poem is a single word, and each successive word is one letter longer than the word before. *See* WARREN F. MOTTE, JR., (ED. & TRANS.), OULIPO: A PRIMER OF POTENTIAL LITERATURE 201 (1986). Queneau's *100,000,000,000,000 Poems* (*100 Trillion Poems*) consists of 10 fourteen-line sonnets, each line of which can be interchanged with the corresponding line in any other sonnet. Given that each sonnet has fourteen lines, and that each line of each sonnet can be interchanged with its homologue from any of the remaining nine sonnets, the "combinatory ensemble" yields 10^{14} individual sonnets. *See id.* at 3.

[73] *See* MOTTE, *supra* note 72, at 5.

[74] *See* HARRY MATHEWS ET AL., OULIPO COMPENDIUM 172 (1998). Here is Perec's description of how he plotted the novel:

> I decided to use a principle derived from an old problem well known to chess enthusiasts as the Knight's tour; it requires moving a knight around the 64 squares of a chess-board without its ever landing more than once on the same square. . . . For the special case of *Life A User's Manual*, a solution for a 10 x 10 chess-board had to be found. . . . The division of the book into six parts was derived from the same principle: each time the knight has finished touching all four sides of the square, a new section begins.

Id.

[75] *See* Bill Seaman, *OULIPO | VS | Recombinant Poetics*, 34 LEONARDO 423, 425 (2001) ("As we trace the development of OULIPO we see an expansion of Oulipian explorations into the use of computer based systems as well as many other fields. OU-x-PO (where x = the field in question), for example, was defined by François Le Lionnais and functions as a generative means to enable infinite expansion into new fields.").

[76] Charles Ames, *Artificial Intelligence and Music Composition*, *in* THE AGE OF INTELLIGENT MACHINES, *supra* note 58, at 389. According to Ames, the tradition of algorithmic composition in music "reaches from Pythagoras and Aristoxenus of antiquity . . . through the Baroque composer Jean-Philippe Rameau, through more recent composers as diverse as Arnold Schoenberg, Henry Cowell, Paul Hindemith, Harry Partch, and Joseph Schillinger to contemporaries such as Pierre Boulez and Iannis Xenakis." *Id.*

mandated repetition of certain notes or strings of notes.[77] Perhaps not surprisingly, given the extent to which algorithmic methods of composition undermine the notion of romantic authorship and the model of creativity on which it is predicated, critics of Oulipo express fear that the movement and its tenets reduce writers to the role of the machine, unmooring the creative process from the aesthetic intention that makes it meaningful and worthwhile.[78]

¶27 Oulipo's embrace of rules and constraints, however, can productively be understood as a means of making a virtue of necessity; it isn't as if writers (or any other kind of artist, for that matter) can ever really break free of rules—of grammar, of syntax, of diction, etc.[79] Calvino recognized the impossibility of producing work that is completely original, that breaks completely with existing codes and canons; his embrace of "radical formalism"[80] constitutes an acknowledgement that all cultural production is inherently derivative and algorithmic.[81] By Calvino's logic, if there is a difference in the apparent rulishness of human and machine outputs, it can only be a difference in degree; as a *qualitative* matter, computers are as capable (or incapable) of originating things (i.e., of breaking rules) as people are.[82] As Margaret Boden puts it, "[p]eople often think that talk of 'rules' and 'constraints'—especially in the context of computer programs—must be irrelevant to creativity, which is an expression of human freedom. But far from being the antithesis of creativity, constraints on thinking are what make it possible."[83] Without rules, in other words, there can be no creativity—in humans or machines. Alison James makes a similar point in defense of Oulipian methods, arguing that "the strength of Oulipian writing lies precisely in the negotiation of the tension between the mechanical and the human, or between the arbitrary, external constraint, and inner poetic necessity."

¶28 Calvino's figure of the author as a writing machine is about as radical a deconstruction of the figure of the romantic author as a good post-modernist could wish for, and it is arguably one whose time has come in the discourse on copyright law. Jaszi and others have critiqued the ways in which the individualization of the author elides the collective nature of creativity.[84] Perhaps the time has come to extend the critique of romantic authorship to the ways in which the implicit humanization of the author figure prevents us from confronting openly both the rulish nature of human creativity and the potential unruliness of machine production. Copyright law has come to require so little in the way of creativity from human authors that it is worth asking whether it makes sense to require more of machines, particularly in instances where it is impossible to tell whether the work in question was produced manually by a person or procedurally by generative computer code.

¶29 For their part, AI researchers tend to prefer running code to running philosophical debates, so they put their stock in operational definitions of creativity.[85] Boden, whose work in the field of

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[77] *See* MARGARET BODEN, THE CREATIVE MIND: MYTHS AND MECHANISMS 60 (2004).

[78] *See* James, *supra* note 69, at 111 (summarizing Gerard Genette's critique of Oulipo's techniques as a "game of roulette").

[79] *See* MOTTE, *supra* note 72, at 11 ("Every literary work begins with an inspiration (at least that's what its author suggests) which must accommodate itself as well as possible to a series of constraints and procedures that fit inside each other like Chinese boxes. Constraints of vocabulary and grammar, constraints of the novel (division into chapters, etc.) or of classical tragedy (rule of the three unities), constraints of general versification, constraints of fixed forms (as in the case of the rondeau or the sonnet), etc.") (quoting Oulipian Francois Le Lionnais).

[80] Jean-Jacques Poucel, *Oulipo: Explore, Expose, X-po*, http://www.drunkenboat.com/db8/oulipo/feature-oulipo/curator/poucel/intro.html (last visited Mar. 16, 2011).

[81] As Boden has argued, the notion that originality can entail creation *ex nihilo* is an impossible one to maintain. *See* BODEN, *supra* note 77, at 29. Similarly, Robert W. Weisberg critiques the "genius" view of creativity, which posits that geniuses exhibit "special thinking processes that allow [them] to break away from the habitual and the ordinary, in what is often called 'breaking the set.'" ROBERT W. WEISBERG, CREATIVITY: BEYOND THE MYTH OF GENIUS 7 (1993). Weisberg argues instead that creativity comes through ordinary thinking based on continuity with the past: "The new must begin as a variation on old themes." *Id.* at 21; *see also* COPE, *supra* note 61, at 28 ("'New' art, then, consists of a reassembly of already existing art.")

[82] Mozart, commonly regarded as one of the most creative minds in the history of music, also experimented with algorithmic composition in his *Musikalisches Würfelspiel*, or musical dice games, which were designed to generate a seemingly infinite number of "new" works by combining a finite number of discrete musical elements according to a method involving both rules of composition and pure chance. *See* David Cope, *Recombinant Music: Using the Computer to Explore Musical Style*, 24 COMPUTER 22 (July 1991) (explaining how Mozart's *Köchel 516f* can produce 45,949,729,863,572,161 different and stylistically correct musical combinations from two 8 by 11 matrices containing the numbers 1 through 176).

[83] BODEN, *supra* note 77, at 82.

[84] *See* Jaszi, *On the Author Effect*, *supra* note 8.

[85] *See* Schank & Owens, *supra* note 57, at 394 ("Our goal is to come up with an algorithmic definition of creativity, a set of

computational creativity has been enormously influential across the disciplines of art, psychology, and computer science, defines creativity as "the ability to generate novel, and valuable ideas."[86] With respect to the novelty of creative ideas, she distinguishes between two levels or senses of creativity: psychological creativity (P-creativity), which entails the production of novel ideas that are novel for the individual mind that produced them but not novel in absolute terms, and historical creativity (H-creativity), which entails the production of ideas that are novel for the whole of human history.[87] "H-creativity is the more glamorous notion," Boden asserts, "and is what people usually have in mind when they speak of 'real' creativity."[88]

¶30 Boden's bi-partite framework for creativity maps fairly neatly onto existing creativity standards in intellectual property law: H-creativity aligns with the standard of novelty in patent law, which has as its point of reference the state of the art rather than the state of an individual inventor's mind.[89] P-creativity, which focuses on the newness of an idea relative only to the person thinking it and not to society or history as a whole, aligns with the originality standard in copyright law and with copyright law's requirement of independent creation as opposed to absolute novelty.[90] A work can still be considered original under copyright law even if another person has already created it, as long as the second work is not copied from the first.[91] By contrast, the work of a second-comer under patent law could not be considered novel, because the patent system requires novelty in absolute terms.[92]

¶31 Like Boden, Roger Schank and Christopher Owens define creativity in terms of novelty and the specific cognitive skills required to produce it.[93] For them, a creative solution to a problem is "one that uses an object, technique, or tool in a useful and previously undiscovered way."[94] In trying to

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processes and steps that can account for the kind of creative thinking that we observe in people.").

[86] Margaret Boden, *Computer Models of Creativity*, 30 AI MAGAZINE 23, 24 (2009).

[87] BODEN, *supra* note 77, at 32.

[88] *Id.*

[89] *See* Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 330 (1945) ("[S]ome substantial innovation is necessary, an innovation for which society is truly indebted to the efforts of the patentee. . . . [The patent system] is not concerned with the quality of the inventor's mind, but with the quality of his product.").

[90] *See* Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340, 345-46 (1991) ("Originality does not signify novelty; a work may be original even though it closely resembles other works so long as the similarity is fortuitous, not the result of copying. To illustrate, assume that two poets, each ignorant of the other, compose identical poems. Neither work is novel, yet both are original and, hence, copyrightable."); Mag Jewelry Co. v. Cherokee, Inc., 496 F.3d 108, 116 (1st Cir. 2007) ("[A] work is original and may command copyright protection, even if it is completely identical with a prior work, provided it was not copied from such prior work but is rather a product of the independent efforts of its author.") (quoting Melville B. Nimmer & David Nimmer, NIMMER ON COPYRIGHT § 2.01[A] (2007)); Ross, Brovins & Oehmke, P.C. v. Lexis Nexis Grp., 463 F.3d 478, 485 (6th Cir. 2006) ("Copyright law extends protection to works that are 'independently created by the author (as opposed to copied from other works).'") (citation omitted); Waldman Publ'g Corp. v. Landoll, Inc., 43 F.3d 775, 782 (2d Cir. 1994) (quoting Melville B. Nimmer & David Nimmer, NIMMER ON COPYRIGHT § 2.01[A] (2007)).

[91] *See Feist*, 499 U.S. at 345-46.

[92] *See* 35 U.S.C. § 102 (2011) (enumerating the various novelty-related statutory bars to patentability, including prior use, sale, patenting, or publication—domestically or abroad).

The table below illustrates the mapping of Boden's bi-partite theory of creativity onto existing IP standards.

Field of IP	Creativity Construct	Measure of Novelty
Copyright	P-Creativity	Individual
Patent	H-Creativity	Society/History

Joseph Scott Miller has argued that there should be a closer alignment than there is between copyright and patent law standards of originality. *See* Miller, *supra* note 55, at 464. Jeanne Fromer argues that the lower creativity standard in copyright law relative to patent law is consistent with psychological research showing that people don't like artistic works that are "too new." *See* Jeanne Fromer, *A Psychology of Intellectual Property*, 104 NW. U. L. REV. 1441, 1496-98 (2010). By contrast, in the science and engineering domains, large degrees of newness are embraced by the public. *Id.* at 1472. Others scholars have also recently explored the affinity (or lack thereof) between the model of creativity underlying the law of intellectual property and various models of creativity from the social sciences. *See, e.g.,* Gregory N. Mandel, *To Promote the Creative Process: Intellectual Property Law and the Psychology of Creativity*, 86 NOTRE DAME L. REV. 1635.

[93] Schank & Owens, *supra* note 57, at 395.

[94] *Id.*

design software whose output meets the more rigorous standard of novelty associated with patent law, AI researchers like Schank and Owens have set a higher bar for their machines than the Supreme Court in *Feist* set for human authors. And the evidence is already in that generative software can be H-creative when it comes to solving engineering problems; John Koza's apparatus for improved general-purpose PID and non-PID controllers, a control component that can be found in everything from thermostats to automotive cruise control systems, is both the product of a generative computer program and the subject of an issued patent.[95] Koza played no direct role at all in the component's design.[96] Instead, he designed a program into which he input the constraints he needed the component to satisfy.[97] The software took it from there.[98]

¶32 Bracketing abstract questions about the essence of creativity, AI researchers focus instead on building machines that *pass for creative*, software machines like Koza's whose autonomously produced output can be readily (mis)taken for the product of human creativity and ingenuity.[99] In various artistic domains, including literature, drawing, and music, programmers over the years have achieved substantial success in this regard—a prospect that the writer Roald Dahl foresaw in the 1950s with a mix of dread and bemusement.[100]

B. Imagining Computational Creativity

¶33 The protagonist of Dahl's 1954 short story "The Great Automatic Grammatizator" is a diffident young engineer named Adolph Knipe, who, as the story opens, has just played a pivotal role in the invention of a "great automatic computing engine" for the government.[101] Following his success with the project, Knipe, an aspiring (but terrible) writer of fiction, becomes obsessed with the prospect of harnessing the technology embodied in the new machine to overcome his reluctant muse and mass-produce works of literature.[102] Although he is at first troubled by "the old truth that a machine, however ingenious, is incapable of original thought,"[103] he concludes that the rule-bound nature of the English grammar and the computing engine's prodigious memory can be effectively exploited to compensate for its lack of inspiration: "Give it the verbs, the nouns, the adjectives, the pronouns, store them into the memory section as vocabulary, and arrange to have them extracted as required. Then feed it with plots and leave it to write the sentences."[104] Moreover, Knipe discovers as his vision comes to fruition that through "an adjustable coordinator between the 'plot-memory' section

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[95] *See* ROBERT PLOTKIN, THE GENIE IN THE MACHINE: HOW COMPUTER-AUTOMATED INVENTING IS REVOLUTIONIZING LAW AND BUSINESS 1-3 (2009). Koza's controller is the subject of U.S. Patent No. 6,847,851, granted in 2005. *Id.* at 1 n.6. Koza also holds a patent on the genetic program that produced the controller. *Id.* at 3.

[96] *Id.*

[97] *Id.*

[98] *Id.*

[99] *See* BRINGSJORD & FERRUCCI, *supra* note 1, at xxvi ("As we uncover reasons for believing that human creativity is in fact beyond the reach of computation, we will be inspired to nonetheless engineer systems that dodge these reasons and *appear* to be creative.") (emphasis in original); Schank & Owens, *supra* note 57, at 394 ("Whether or not a philosopher would agree that the resulting machine truly embodied creativity is almost irrelevant to us: building machines that act in ways that *appear* to be creative would be a significant enough step to take.") (emphasis in original). In keeping with the focus on the appearance of creativity, the famous Turing Test for AI is an "imitation game" designed to assess whether a computer program can simulate human conversation well enough that a human posing a series of questions blindly to the program and another human has no more than a 70 percent chance of correctly identifying which interlocutor is the human and which is the computer after five minutes of questioning. *See* Graham Oppy & David Dowe, *The Turing Test*, *in* THE STANFORD ENCYCLOPEDIA OF PHILOSOPHY (2008), http://plato.stanford.edu/entries/turing-test/ (last visited Feb. 5, 2012). The computer's ability to fool the human interrogator enough of the time is treated as a rough proxy for intelligence. *See id.*

[100] *See* ROALD DAHL, THE GREAT AUTOMATIC GRAMMATIZATOR AND OTHER STORIES 3-26 (2001).

[101] *Id.* at 3.

[102] *Id.* at 5-7. Dahl's own muse was apparently also reluctant: "He was not, by his own admission, a quick writer and might take six months on a story—'sometimes as much as a month on the first page.'" *Master of the Unexpected: Dahl's Writing for Adults*, ROALD DAHL BIOGRAPHY, http://www.roalddahl.com/ (last visited Feb. 5, 2012).

[103] DAHL, *supra* note 100, at 6.

[104] *Id.* at 7.

and the 'word memory' section," he can produce stories in any style he wants, "simply by pressing the required button."[105]

¶34 By the end of a few months of tinkering, Knipe has a working prototype covered in buttons, dials, and levers—an ungainly contraption that Dahl describes as looking like an elaborately instrumented airplane cockpit.[106] By the story's end, Knipe has perfectly calibrated his literary machine to produce an endless supply of stories and novels to feed the reading public's insatiable appetite for formulaic fiction.[107] Leveraging technology to overcome his writer's block, our (anti-) hero corners the market on magazine fiction and thereby consigns to poverty and oblivion principled writers with the courage to resist "the machine."[108]

¶35 On one level, Dahl's dystopian vision of a literary market saturated by machine-authored drivel registers a moment of historical anxiety within the creative class about the evolution of computing and its potential impact on the artistic enterprise.[109] The story can as easily be read, however, as a satire on contemporary popular magazine editors and their uninspired approach to evaluating and selecting human-authored fiction. If it was true for Dahl in 1954 that authors should fear "the machine," it was also apparently true in 1954 that the machine had already arrived—in the very human form of commoditizing editors pandering to the reading public's lowest common denominator. While it would surely be a stretch to suggest that Dahl and Calvino were fellow travelers in the literary avant-garde, each clearly accepted some version of the proposition that all writers to a greater or lesser degree are compelled by the circumstances of literary production to be algorithmically creative.

C. Coding Computational Creativity

¶36 In 2003, not quite 50 years after Dahl gave the world Adolph Knipe and his infernal machine, Raymond Kurzweil was granted United States Patent No. 6,647,395 for a "computer-implemented method of generating a poet personality including reading poems, . . . generating analysis models, . . . and storing the analysis models in a personality data structure."[110] Kurzweil's invention, which he dubbed the Cybernetic Poet, is designed to be used either as a "poet's assistant" or as an automatic poetry generator.[111] The program is "provided with an input file of poems written by a human author or authors. It analyzes these poems and creates a word-sequence model based on the poems it has just read. It then writes original stanzas of poetry using the model it has created."[112] The resulting stanzas, according to the patent's written description, "will have a similar style to the poem(s) originally analyzed and contained in the author analysis model, but will be *original poetry generated by the process*."[113] An example of the Cybernetic Poet's work is a haiku called "Moon Child," written in the

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[105] *Id.* at 11.

[106] *See id.* at 20.

[107] *See id.* at 18, 26.

[108] The story concludes with the narrator, a writer who has refused to sign a contract with Knipe, praying on behalf of himself and his fellow hold-outs for "strength, Oh Lord, to let our children starve." *Id.* at 26.

[109] In 1950, just a few years before Dahl published "The Great Automatic Grammatizator," Alan Turing published "Computer Machinery and Intelligence," the now-famous paper in which he proposed the imitation game that would come to be known as the Turing Test. *See* THE AGE OF INTELLIGENT MACHINES, *supra* note 57, at 198. In those early days of computing, the potential of AI seemed unlimited, particularly to researchers working in the field. *See id.* ("In the 1950s concrete progress began to be made. Initial progress came so rapidly that some of the early pioneers felt that mastering the functionality of the human brain might not be so difficult after all.").

[110] U.S. Patent No. 6,647,395 (filed Nov. 1, 2000).

[111] *See id.* ("The displayed text may be in response to a user input or via an automatic composition process.").

[112] THE AGE OF INTELLIGENT MACHINES, *supra* note 57, at 374. The poets whose styles the Cybernetic Poet was initially coded to emulate were T.S. Eliot, Percy Bysshe Shelley, and William Carlos Williams. *See id.* at 378 n.1.

David Cope's music generator, Experiments in Musical Intelligence (EMI), which Cope began coding in 1981, follows a similar model: "[EMI] composes by first analyzing the music in its database and then using the rules it discovers there to create new instances of music in that style." David Cope, *Facing the Music: Perspectives on Machine-Composed Music*, 9 LEONARDO MUSIC JOURNAL 79, 79 (1999). The musicians whose styles EMI was coded to emulate included Bach, Mozart, Beethoven, and Chopin. *Id.*

[113] U.S. Patent No. 6,647,395 (filed Nov. 1, 2000) (emphasis added).

style of the poet Kathleen Francis Wheeler: "*Crazy moon child/ Hide from your coffin/To spite your doom.*"[114]

¶37 To test the bona fides of his procedurally generated poems, Kurzweil designed and executed a domain-specific Turing Test,[115] in which he had 16 people—a combination of children and adults—attempt to identify the origin of 28 different stanzas of poetry, among which were stanzas written by the Cybernetic Poet, stanzas written by Kurzweil himself, and stanzas written by the poets whose styles the program emulates.[116]The 13 adult judges, who had varying degrees of computer and poetry experience and knowledge, were able to correctly identify the source of the poetry an average of 63 percent of the time—only slightly better than the level of chance.[117] The three children judges were correct an average of 48 percent of the time—about the level of chance.[118] If the computer output had been readily identifiable as such, the judges would have been able to do a better job of differentiating between the two sources than they actually did, leading Kurzweil to conclude that his program achieved "some level of success" at imitating human artistry.[119] Some of the stanzas written by the computer were particularly successful at fooling the judges.[120]

¶38 Kurzweil's Cybernetic Poet is just one of several automatic literature-generating programs that appear in the AI literature.[121] In *Artificial Intelligence and Literary Creativity: Inside the Mind of BRUTUS, a Storytelling Machine*, Selmer Bringsjord and David Ferrucci document their five-year project to code "by hook or by crook, a system that qualifies, in 'Turing Testish' terms, as a genuinely creative agent"—a "silicon author able to generate stories that would be regarded as creative, even if these stories are well below what a muse-inspired member of *Homo sapiens sapiens* can muster."[122] In designing BRUTUS, Bringsjord and Ferrucci sought to imbue the program with wide variability across the various dimensions over which a short story can vary: plot, character, setting, themes, writing style, and imagery. They began from the premise that sophisticated or "belletristic fiction,"[123] exhibits a high degree of variability across these various dimensions, whereas formulaic fiction (e.g., genre fiction like romance and mystery novels) exhibits a low degree of variability. In order to ensure variability, they set out to produce a generator with architectural differentiation, so that "for each substantive aspect of the story that can vary, there [would be] a corresponding distinct component of the technical architecture that [could] be parameterized to achieve different results."[124]

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[114] *Poetry by the Cybernetic Poet*, KURZWEIL CYBERART TECHNOLOGIES, http://www.kurzweilcyberart.com/poetry/rkcp_how_it_works.php (last visited Feb. 5, 2012).

[115] *See supra* note 108 and accompanying text.

[116] THE AGE OF INTELLIGENT MACHINES, *supra* note 57, at 377.

[117] *Id.*

[118] *Id.*

[119] *Id.*

[120] *Id.*

[121] In the popular media, the most well-known example is probably that of Scott French, a programmer who published a novel in 1993 written by his Macintosh IIcx, Hal, in the style of romance novelist Jacqueline Susann. *See* John Boudreau, *A Romance Novel With Byte: Author Teams Ups With Computer to Write Book in Steamy Style of Jacqueline Susann*, LA TIMES, Aug. 11, 1993, at 6. According to French, "[t]he most difficult thing was trying to analyze exactly what constitutes a writer's style." *Id.* To do so, he scanned portions of two of Susann's novels and analyzed several hundred plot and style elements across the two texts. "Once you're there," French said, "the writer's style emerges, part of her actual personality comes out, and the computer can be programmed to make a story." *Id.* Although French admitted to having had a hand in editing Hal's output, he claimed that "it did almost 100% of the plot, 100% of the theme and style." *Id.*

Another popular example is Racter, a program by William Chamberlain and Thomas Etter, which purportedly wrote a collection of poetry and prose called *The Policeman's Beard is Half Constructed*, which was published in 1984. *See* John Barry, *Computer Writes*, INFOWORLD, Oct. 29, 1984, at 10. According to Chamberlain, Racter was written in compiled BASIC on a Z80 Micro with 64 KB of RAM. *Id.* Little is really known, however, about Racter's underlying architecture or technical features. *See, e.g.*, HOFSTADTER, *supra* note 66, at 472-73 (lamenting that "the book itself tells precious little of Racter's mechanisms"). In addition, Chamberlain's disclaimer (similar to French's) that "the programmer is removed to a very great extent" from Racter's production makes it difficult to assess how autonomously the program actually operated. *Id.*

[122] BRINGSJORD & FERRUCCI, *supra* note 1, at 6, xxiii.

[123] *Id.* at xxiv.

[124] *Id.*

¶39 Bringsjord and Ferrucci named their silicon author BRUTUS because the first theme with which they experimented was betrayal. The first setting they coded for BRUTUS was the university. By the end of their project, BRUTUS had produced, among other variants on the same theme, the following story:

> Dave Striver loved the university—at least most of the time. Every now and then, without warning, a wave of . . . well, it was true: a wave of *hatred* rose up and flowed like molten blood through every cell in his body. This hatred would be directed at the ghostly gatekeepers. But most of the time Striver loved—the ivy-covered clock towers, the ancient and sturdy brick, and the sun-splashed verdant greens and eager youth who learned alongside him. He also loved the fact that the university is free of the stark unforgiving trials of the business world—only this *isn't* a fact: academia his [sic] its own tests, and some are as merciless as any in the marketplace. A prime example is the dissertation defense: to earn the PhD, to become a doctor, one must pass an oral examination on one's dissertation.
>
> Dave wanted desperately to be a doctor. He had been working toward this end through six years of graduate school. In the end, he needed the signatures of three people on the first page of his dissertation, the priceless inscriptions which, together, would certify that he had passed his defense. One of the signatures had to come from Professor Hart.
>
> Well before the defense, Striver gave Hart a penultimate copy of his thesis. Hart read it and told Striver that it was absolutely first-rate, and that he would gladly sign it at the defense. They shook hand in Hart's book-lined office. Hart's eyes were bright and trustful, and his bearing paternal.
>
> "See you at 3 p.m. on the tenth, then, Dave!" Hart said.
>
> At the defense, Dave eloquently summarized Chapter 3 of his dissertation. His plan had been to do the same for Chapter 4, and then wrap things up, but now he wasn't sure. The pallid faces before him seemed suddenly nauseating. What was he doing?
>
> One of these pallid automata had an arm raised.
>
> "What?" Striver snapped.
>
> Striver watched ghosts look at each other. A pause.
>
> Then Professor Teer spoke: "I'm puzzled as to why you prefer not to use the well-known alpha-beta minimax algorithm for your search?"
>
> Why had he thought so earnestly about inane questions like this in the past? Striver said nothing. His nausea grew. Contempt, fiery and uncontrollable, rose up.
>
> "Dave?" Professor Hart prodded, softly.
>
> God, they were pitiful. Pitiful, pallid, and puny.
>
> "Dave, did you hear the question?"
>
> Later, Striver sat alone in his appartment [sic]. What in God's name had he done?

¶40 Although Bringsjord and Ferrucci did not report having subjected BRUTUS' final output to a Turing-like Test, it seems more than plausible that BRUTUS would have passed with flying colors. The two concluded, nonetheless, that BRUTUS exhibited only "weak creativity," a concept they define expressly in terms of Boden's concept of P-creativity.[125] Furthermore, when they describe BRUTUS as an author, they always put the term in scare quotes, because they believe, following Lovelace, that BRUTUS can't originate anything: "He is capable of generating [stories] because two humans spent years figuring out how to formalize a generative capacity sufficient to produce . . . stories, and they then [were] able to implement part of this formalization so as to have a computer

[125] BRINGSJORD & FERRUCCI, *supra* note 1, at xix ("Put in terms of our terminology, we say that BRUTUS has weak, rather than strong, creativity."). Bringsjord and Ferrucci define "strong creativity" in terms of Boden's concept of H-creativity. *Id.* Computers, they assert, have an easy time with P-creativity and a much harder time with H-creativity. *Id.*

produce such prose."[126] Bringsjord and Ferrucci were ultimately disappointed at the end of their project that BRUTUS, at least in its first incarnation, ended up producing only "decent short short stories" as opposed to "belletristic fiction."[127] Doubtless, however, there are plenty of humans who could not have produced a story of betrayal as nuanced as BRUTUS' story of Dave's deflating dissertation defense.

III. ARTIFICIALLY INTELLIGENT AUTHORS: TECHNOLOGICAL PROGRESS OR OXYMORON?

¶41 Of course, BRUTUS *did* originate its stories in the copyright sense that the stories were not copied from any existing literary works. The same is true of the poems generated by the Cybernetic Poet, which actually incorporates a software module that prevents plagiarism by rejecting sequences of more than three consecutive words that appear in any of the original poems used by the program to generate analysis models for particular poet personalities.[128] Moreover, to the extent that the "modicum of creativity" *Feist* requires is no more than Boden's construct of weak or P-creativity, then BRUTUS' "decent short short stories," while they may not be award winners, are arguably as creative as copyright law requires.[129] The question that logically follows is whether the *automated* P-creativity of which story- and poem-generators like BRUTUS and the Cybernetic Poet are capable is sufficient to satisfy *Feist*, given the Court's rejection in *Feist* of mechanical, routine production and the historical emphasis in copyright cases on intellectual labor as a criterion for authorship. Put another way, the question is whether computers can only ever be authors in the scare-quoted sense and not Authors in the constitutional sense.

¶42 Although the proposition that procedurally generated artworks are copyrightable has not been tested in the case law, cases involving claims of non-human authorship have arisen over the years in the curious context of automatic writing. Automatic writing, also called psychography, is a technique for channeling messages from the spirit world that is commonly associated with the Spiritist movement founded by Allan Kardec in nineteenth-century France.[130] The person who actually produces psychographic writing claims to act only as an amanuensis for a disembodied spirit or consciousness.[131] In disputes over ownership of the rights in psychographic works, the questions that arise are essentially the same as those that arise in cases involving works created by generative software programs: To what or whom do these works owe their origin? Does copyright subsist in them? If so, to whom does it belong? To the extent that more than one party played a role in bringing these works to the public, do the parties share authorship? If so, what if one of those parties is not a legal person?

¶43 *Cummins v. Bond*, an English case from 1927, involved a dispute over the copyright in a psychographic work called "The Chronicle of Cleophas," which purportedly recounted the acts and teachings of the Apostles.[132] The plaintiff in the case was a journalist by profession who acted in her spare time as a spiritualist medium at séances and as a practitioner of automatic writing.[133] The work in question "was written at high speed under the alleged influence of an external psychic agent, and in archaistic language without stops, and not in the ordinary handwriting of the plaintiff."[134] The

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[126] *Id.* at 5.

[127] *Id.* at 63.

[128] *See* Ray Kurzweil's Cybernetic Poet: How It Works, http://www.kurzweilcyberart.com/poetry/rkcp_how_it_works.php (last visited Feb. 5, 2011).

[129] Remember that courts deciding copyright cases must studiously avoid making aesthetic judgments about the works before them. *See* Bleistein v. Donaldson Lithographing Co., 188 U.S. 239, 251 n.30 (1903).

[130] *See generally* ALLAN KARDEC, EXPERIMENTAL SPIRITISM; BOOK ON MEDIUMS OR, GUIDE FOR MEDIUMS AND INVOCATORS (Emma A. Wood trans., 1874).

[131] *Id.* at 190 (explaining that psychography is "the transmission of the thought of the spirit by means of writing by the hand of a medium," whereas pneumatography is "writing produced directly by the spirit, without a medium").

[132] Cummins v. Bond, 1 Ch. 167 (1927).

[133] *Id.* at 168.

[134] *Id.* at 167. The spirit the plaintiff claimed to have channeled was that of the Abbey of Glastonbury. *Id.* at 172. "The

defendant was an architect and automatic writing enthusiast to whom the plaintiff gave the manuscript to organize and edit, with the expectation that he would return it to her when he was finished.[135] When the defendant refused to return the original copy of the work to the plaintiff (and published several excerpts from it), the plaintiff sued for an injunction, claiming copyright in the work.[136] The defendant challenged the validity of the copyright, arguing that the work was "wholly communicated in substance and form by a psychic agent" and, therefore, "not an original literary work in which copyright could subsist."[137]

¶44 The court decided the case in favor of the plaintiff, on the basis that she actively cooperated in translating the spirit's words into a comprehensible language.[138] The court also found it significant that the entire manuscript was physically written by her alone, none of it having been dictated by the defendant or any other living person.[139] While the court somewhat cheekily raised the possibility that the plaintiff and the spirit of Cleophas "ought to be regarded as joint authors and owners of the copyright," the judge was ultimately unprepared to decide that "authorship and copyright rest with someone already domiciled on the other side of the inevitable river."[140] The matter had to be decided, the court concluded, as a purely terrestrial one, and rights to the work had to be vested in a terrestrial being.[141]

¶45 In a more recent case, *Penguin Books U.S.A., Inc. v. New Christian Church of Full Endeavor, Ltd.*,[142] it was likewise decided that the rightful owner of the copyright in a psychographic work is the individual who acted as the spirit's scrivener. The work at issue, a new age religious text called "A Course in Miracles," was committed to paper by a Columbia University psychology professor named Helen Schucman after a "Voice" (later identified as that of Jesus) ordered her to take notes in a process of "rapid inner dictation."[143] After taking the divine dictation, Professor Schucman enlisted a colleague to help her organize and edit the manuscript, which the two revised in several drafts.[144] Both professors maintained that their personal preferences and concerns played no role in their editing decisions, all of which were purportedly guided and confirmed by the Voice.[145]

¶46 According to the professors' version of the facts, the Voice gave legal advice in addition to spiritual guidance, instructing Professor Schucman to register the copyright in the Course, which was finding an audience much larger than she had anticipated.[146] With respect to the registration, the Voice allegedly adamantly told Professor Schucman that "[her] name could not appear on the Course's copyright page because Jesus had cautioned her against publicly associating her name with it, lest people confuse her role with his or the Holy Spirit's."[147] According to one member of Schucman's inner circle, Schucman and her colleagues inquired about registering the copyright to

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method of writing was as follows: The plaintiff covered her eyes with her left hand, took a pencil in her right hand and rested it on a wad of foolscap paper. After a while, she passed into a sort of dream state, and her hand commenced to write very rapidly, sometimes over 2000 words in an hour and a half without any pause." *Id.* at 168.

[135] *Id.* at 168.

[136] *Id.* at 170.

[137] *Id.*

[138] *Id.* at 173.

[139] *Id.* at 173-75 (rejecting the defendant's claim of joint authorship based on his presence at the séances where the writings took place, which allegedly enabled him to communicate telepathically to the plaintiff some of the historical references that found their way into the manuscript).

[140] *Id.* at 173.

[141] *Id.* at 175 ("I can only look upon the matter as a terrestrial one, of the earth earthy, and I propose to deal with it on that footing. In my opinion the plaintiff has made out her case, and the copyright rests with her.").

[142] No. 96 Civ. 4126, 2000 U.S. Dist. LEXIS 10394 (S.D.N.Y. July 21, 2000).

[143] *Id.* at *5-6.

[144] *Id.* at *7-9.

[145] *Id.* at *7-8.

[146] *Id.* at *13.

[147] *Id.* at *16. Professor Schucman herself had expressed the eminently reasonable concern that associating her name with the Course could damage her reputation as a serious academic. *Id.* at *11.

Jesus but were told that "a copyright could not be granted to a non-physical author."[148] In a compromise, the copyright registration listed the work's author as "[Anonymous](Helen Schucman)."[149]

¶47 As to the validity of the copyright, the court held that there were two separate bases for concluding that the Course was copyrightable.[150] First, even though the work was allegedly dictated by a non-human, Schucman made editorial choices of her own that were sufficient both to satisfy *Feist*'s low creativity standard and to make her the work's author.[151] Alternatively, the court held, citing *Cummins*, that "[a]s a matter of law, dictation from a non-human source should not be a bar to copyright," regardless of whether the person taking the dictation can be found to have exercised any independent editorial judgment in the process of recording the work.[152]

¶48 In the handful of cases involving psychographic works, courts have consistently recognized the existence of copyright, despite assertions by litigants that the works are of non-human, supernatural origin.[153] In response to the argument that such works are not copyrightable because they lack the necessary element of creativity required by *Feist*, the Ninth Circuit pointed out in *Urantia Foundation v. Maaherra* that "copyright laws . . . do not expressly require 'human' authorship."[154] In *Urantia Foundation* and the other automatic writing cases, despite the fact that human authorship is altogether disavowed by the parties claiming copyrights, courts have found a sufficient nexus to human creativity to sustain copyright.[155]

¶49 With respect to the question of copyright in procedurally generated artworks, the 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. Because copyright law does not expressly require human authorship, artificially intelligent computer programs that autonomously generate art need not be relegated for copyright purposes to scare-quoted authorship; their works can be regarded as proper "works of authorship" under § 102 of the Copyright Act by virtue of their nexus to human creativity.

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[148] *Id.* at *13-16.

[149] *Id.* at *17. It's not clear why Professor Schucman didn't elect to have her name omitted entirely from the registration, which the Copyright Office permits. *See Help: Author*, U.S. COPYRIGHT OFFICE (July 29, 2011), http://www.copyright.gov/eco/help-author.html (explaining that a registrant may (1) reveal the author's identity even though the work is anonymous, or (2) leave the author fields blank, or (3) give "Anonymous" in the last name field). According to the facts in the opinion, the plaintiffs later denied that they had ever attempted to register the copyright in the name of Jesus. *Penguin Books*, 2006 U.S. Dist. at *16.

[150] *Penguin Books*, 2006 U.S. Dist. at *34.

[151] *Id.* (holding that "although in each instance the non-human author had the final say, the humans had at least some input into, and effect on, the form and content," which means that "the Course can be protected as a particular compilation of facts").

[152] *Id.* at *36.

[153] *See* Urantia Found. v. Maaherra, 114 F.3d 955, 963-64 (9th Cir. 1997) (holding that "notwithstanding the Urantia Book's claimed non-human origin, the Papers in the form in which they were originally organized and compiled by the members of the Contact Commission were at least partially the product of human creativity"); Garman v. Sterling Publ'g Co., 1992 U.S. Dist. LEXIS 21932, at *7 (N.D. Cal. Nov. 5, 1992) (finding "no legal relevance to the assertions by both parties that the information was provided by spiritual guides"); Urantia Found. v. Burton, K 75-255 CA 4, 1980 WL 1176, at *1, *5 (W.D. Mich. Aug. 27, 1980) (stating that although "there 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. . . . The source of the patient's inspiration is irrelevant"); Oliver v. Saint Germain Found., 41 F. Supp. 296, 299 (S.D. Cal. 1941) (finding that there may be copyright in the style or arrangement of messages received from the spiritual world for recordation and use by the living).

[154] *Urantia Foundation*, 114 F.3d at 958 (stating that "copyright laws . . . do not expressly require 'human' authorship," and holding that "a work is copyrightable if copyrightability is claimed by the first human beings who compiled, selected, coordinated, and arranged" it); *but see* Kelley v. Chicago Park Dist., 635 F.3d 290, 304 (7th Cir. 2011) (citing *Patry on Copyright* for the proposition that "[a]uthors of copyrightable works must be human; works owing their form to the forces of nature cannot be copyrighted").

[155] Note that this interpretation of copyright law's creativity requirement excludes from copyright protection the crude paintings and drawings produced by animals like elephants and chimpanzees. The requirement of a nexus to human creativity is, in this sense, a useful limiting principle.

IV. PROTECTING WORKS OF ARTIFICIALLY INTELLIGENT AUTHORSHIP

A. If Copyright, Then Whose Copyright?

¶50 On the question of who should be held to own the copyright in procedurally generated works, the automatic writing cases are somewhat less helpful. In those cases, courts have consistently taken the pragmatic approach of attributing authorship for copyright purposes to the person who held the pen and did the actual writing. With procedurally generated artwork, however, there is no one holding the proverbial pen. Whereas automatic writing proximately involves human endeavor (i.e., the output in question is human-generated), procedurally generated art does not (i.e., the output is machine-generated). The procedurally generated work's relationship to a human creative agent is more mediated, more attenuated. The author of a procedurally generated artwork is, for all intents and purposes, *another copyrighted work*—a literary work in the form of a computer program. Human creativity is necessary for the production of the work, but the human creative agent is not the author of the work in the traditional sense. Nor is generative software an author's tool in the traditional sense; unlike a pen or a paintbrush, or even a camera, generative software has a verbal or visual vocabulary of its own and the ability to compose a range of distinct works from that vocabulary by independently applying a system of rules.[156]

¶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.[157] Intuition and the principle of transitivity both suggest that the programmer of generative software is the logical owner of the copyright in the works generated by his or her software. He or she is, after all, *the author of the author* of the works. As Randall Davis wrote of Harold Cohen, the artist and programmer responsible for AARON,[158] a sophisticated generative drawing program whose output has hung in museums around the world: "He writes programs that draw pictures."[159] For Davis, "the ownership issues seem clear" when it comes to

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[156] *See, e.g.*, Roman Verostko, *Epigenetic Art Revisited: Software as Genotype*, *in* CODE: THE LANGUAGE OF OUR TIME 156, 159-60 (Gerfried Stocker & Christine Schöpf eds., 2003) (describing the "form generating routines" employed by his program, Hodos, to produce individual colored drawings that are "'one of a kind'. . . [but] share strong familial features because they share the same algorithmic parents").

[157] Although we may be fast approaching a time when artificial intelligences achieve the status of legal personhood, that time is not yet here. *See generally* James Boyle, *Endowed by their Creator? The Future of Constitutional Personhood*, The Brookings Institution Future of the Constitution Series, No. 10 (Mar. 9, 2011), *available at* http://www.brookings.edu/papers/2011/0309_personhood_boyle.aspx; Lawrence B. Solum, *Legal Personhood for Artificial Intelligences*, 70 N.C. L. REV. 1231 (1992).

This fact led Ralph Clifford to argue in the late 1990s that works generated autonomously by computers should remain in the public domain unless (or until) AI evolves to the point at which computers can be endowed with a consciousness that allows them to respond to the incentives created by copyright law. *See* 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, 1702-03 (1997). In a similar vein, Pamela Samuelson argued in 1986 that computers cannot, and should not, be classified as authors because they need no incentives to generate output. *See* Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1199 (1986). "Only those stuck in the doctrinal mud," Samuelson wrote, "could even think that computers could be 'authors.'" *Id.* at 1200.

When considering the question of legal personhood for artificially intelligent entities, however, it is important to acknowledge the fact that being human has historically been neither sufficient nor necessary for obtaining legal personality. *See* SAMIR CHOPRA & LAURENCE F. WHITE, A LEGAL THEORY FOR AUTONOMOUS ARTIFICIAL AGENTS 157-58 (2011) (pointing out that slaves were not legal persons at all under antebellum U.S. law; that women and children had claims to legal personhood only indirectly through husbands and fathers; that admiralty law treats a ship as a legal person capable of being sued in its own right; and that business corporations, incorporated associations, and government agencies have been recognized as having legal personality).

[158] One doesn't get very far into the literature in this field before encountering discussions of AARON and examples of its quite impressive work. *See, e.g.*, BODEN, *supra* note 77, at 137-54 (discussing the accomplishments and limitations of the program as an autonomous creative agent); LEVY, *supra* note 57, at 181-86 (discussing AARON's history and method of operation); PAMELA MCCORDUCK, AARON'S CODE: META-ART, ARTIFICIAL INTELLIGENCE, AND THE WORK OF HAROLD COHEN (1991).

Cohen himself has written at length over the years about his work on/with AARON. *See, e.g.*, Harold Cohen, *A Self-Defining Game for One Player: On the Nature of Creativity and the Possibility of Creative Computer Programs*, 35 LEONARDO 59 (2002); Harold Cohen, *Colouring Without Seeing: A Problem in Machine Creativity* (1999), *available at* http://www.kurzweilcyberart.com/aaron/hi_essays.html; Harold Cohen, *The Further Exploits of AARON, Painter*, 4 STANFORD ELECTRONIC HUMANITIES REV. (1995), *available at* http://www.stanford.edu/group/SHR/4-2/text/toc.html.

[159] Randall Davis, *Intellectual Property and Software: The Assumptions are Broken*, *in* WORLD INTELLECTUAL PROPERTY ORGANIZATION WORLDWIDE SYMPOSIUM ON THE INTELLECTUAL PROPERTY ASPECTS OF ARTIFICIAL INTELLIGENCE 101, 102 (1991), *available at* http://dspace.mit.edu/handle/1721.1/5975.

software-authored works, because "human action [is] inevitably at the core of the creative process" that leads to the production of such works.[160]

¶52 What may be clear intuitively or conceptually, however, is not necessarily clear doctrinally. From the point of view of the Copyright Act and the case law interpreting it, it *is* clear that the programmer of generative software owns the copyright in the software itself[161] (e.g., that Harold Cohen owns the copyright in AARON or that Raymond Kurzweil owns the copyright—as well as a patent—in the Cybernetic Poet); it is *less* clear, however, that the programmer has any defined *statutory* claim to copyright in the works produced autonomously by the software, which, after all, functions all by itself, making individual compositional choices entirely independently.[162] One could simply cut out the middle-machine and argue that Raymond Kurzweil "really" wrote the poems composed by the Cybernetic Poet or that Harold Cohen "really" painted the pictures composed by AARON, but to do so would miss something very important about the nature of these works and the process by which they are produced. Such statements are simply not true, even if they get us around the problem that copyright law is not currently structured to accommodate the particular authorship matrix of people-who-write-programs-that-make-art.

B. A Bad Penny of a Question

¶53 As hard as it is to believe in retrospect, given what turned out to be the slow maturation of AI research, the Register of Copyrights identified the question of computer authorship as one of three "major problems" confronting the Copyright Office in 1965.[163] According to the Register's annual report that year, the "crucial question" to be answered with respect to works whose registrants present them as computer-authored is "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 . . . were actually conceived and executed not by man but by a machine."[164] The Register offered no answer to this question, however, and the absence of references to the issue in subsequent annual reports suggests that the urgency of finding an answer abated.

¶54 When Congress created the National Commission on New Technological Uses of Copyrighted Works (CONTU) in 1974, the looming problem of computer authorship was still no closer to being solved.[165] Among the specific topics CONTU was asked to study was the creation of new works with computer assistance.[166] With respect to the question of computer authorship, CONTU concluded in its Final Report that the development of an artificial intelligence capable of independently creating works was "too speculative to consider at this time."[167] The Final Report channeled Ada Lovelace's critique of the Analytical Engine:

> [T]he Commission believes that there is no reasonable basis for considering that a computer in any way contributes authorship to a work produced through its use. 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

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[160] *Id.* at 104.

[161] *See* 17 U.S.C. § 201 (2011) (providing that copyright vests initially in the author of a work); Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240, 1249 (3d Cir. 1983) (holding that "a computer program, whether in object code or source code, is a 'literary work' and is protected from unauthorized copying, whether from its object or source code version").

[162] For a detailed discussion of how AARON paints, see articles by Harold Cohen cited *supra* at note 158.

[163] REGISTER OF COPYRIGHTS, *supra* note 4, at 4 ("The Copyright Office was confronted with three major problems during the fiscal year as a result of the constantly expanding development and use of computers: registration for computer programs, computer authorship, and automation in the Copyright Office.").

[164] *Id.* at 5.

[165] CONTU was first proposed in legislation in 1967, but it was not actually established until 1974. *See* NAT'L COMM'N ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, FINAL REPORT 4 (1978) (hereinafter "CONTU REPORT"), *available at* http://eric.ed.gov/PDFS/ED160122.pdf.

[166] *See* Pub. L. No. 93-573, 93d Cong. (1974) (mandating the creation of CONTU to study and make recommendations concerning, *inter alia*, "the creation of new works by the application or intervention of . . . automatic systems").

[167] CONTU REPORT, *supra* note 165, at 44.

is directed to do in the way it is directed to perform.[168]

¶55 In its final recommendations to Congress, CONTU recommended that there be no change to the Copyright Act in consideration of new works produced through the application or intervention of automatic systems.[169]

¶56 The issue resurfaced in Congress in 1986—this time in a report issued by the Office of Technology Assessment (OTA) to evaluate the intellectual property policy implications of rapid advances in computer networking and interactive computing.[170] Between the release of the CONTU report in 1976 and the OTA report in 1986, the PC revolution had begun,[171] and new questions about property rights in computer-generated output were beginning to take shape.[172] The OTA report was concerned, among other things, with questions of authorship and copyright ownership raised by new developments in interactive computing, including computer-mediated interactive storytelling, computer-aided design (CAD), interactive computer graphics and image-editing, and digital music sampling and editing.[173] With these technologies, the report's authors asserted, figuring out where the programmer's expression ends and the user's expression begins is a difficult task—a situation that becomes all the more complicated when the program itself is coded to make expressive choices independently of programmer and user alike.[174]

¶57 Significantly, the authors of the OTA report questioned CONTU's conclusion that computers were simply "inert tools of creation" that could not possibly contribute authorship to any work produced through their use.[175] By 1986, computing had progressed beyond simple tasks like word processing, which the authors of the OTA report characterized as "'transparent' to the writer's creativity."[176] The authors of the OTA report recognized a critical difference between word processors and programs that autonomously produce summaries of articles or rearrange existing musical works into new compositions.[177] In such programs, the authors wrote, "creative activities…fuse with machine intelligence," and there is a "blurring of the distinction between the copyrighted work and its product."[178] What was clear to CONTU in 1976—that computer users should be regarded as the sole authors of works created using computers (and the sole owners of the copyrights in those works)—was much less clear to OTA only a decade later.

¶58 Disagreeing with CONTU, the OTA authors suggested that interactive computer programs might legitimately be considered co-authors of the output they produce.[179] But co-authors with whom? The programmer? The user? Both? And what about authorship in works whose production is predominantly automated and non-interactive? Who is the author of those? Who owns the copyright in them? These were all wide open questions; however, on a list of priorities for policy intervention, the OTA ranked problems associated with computer authorship below other computer-related copyright problems (*viz.*, enforcement, private use, functional works, and the international intellectual

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[168] *Id.*

[169] *Id.* at 46. The report did recommend several amendments to the Copyright Act with respect to the protection of computer programs: (1) the repeal of existing Section 117; (2) the creation of a new Section 117 to limit exclusive rights in computer programs; and (3) the addition of a definition of "computer program" to Section 101. *Id.* at 12.

[170] *See* U.S. OFFICE OF TECH. ASSESSMENT, INTELLECTUAL PROPERTY RIGHTS IN AN AGE OF ELECTRONICS AND INFORMATION (1986) (hereinafter "OTA REPORT").

[171] *See generally* THE AGE OF INTELLIGENT MACHINES, *supra* note 57, at 478-81 (setting forth a timeline of critical dates in the history of computing, including the introduction of the Apple II computer in 1977 and the IBM PC in 1981).

[172] *See, e.g.*, OTA Report at 59 (discussing the law's "race with technology" in the copyright domain).

[173] *See id.* at 70.

[174] *See id.*

[175] *See id.* at 72 ("It is misleading . . . to think of programs as inert tools of creation, in the sense that cameras, typewriters, or any other tools of creation are inert.").

[176] *Id.* at 69.

[177] *See id.*

[178] *Id.* at 73.

[179] *Id.* at 72 ("CONTU's comparison of a computer to other instruments of creation begs the question of whether interactive computing employs the computer as co-creator, rather than as an instrument of creation.").

property system).[180] Along with protecting the integrity of works in the digital environment, the report classified the issue of computer authorship as "important" but "less ripe [than others] for immediate action" by Congress.[181]

¶59 As is often the case with copyright and innovation, however, litigants force issues on which policymakers demur, leaving courts to decide whether and how to reconcile old law with new technology. In the early 1980s, disputes arose concerning copyrights in electronic video arcade games and their audiovisual displays.[182] In these cases, which almost altogether eschew sustained legal analysis, a number of courts held that game displays are copyrightable by the owner of the copyright in the game program that generates the displays.[183] Moreover, the courts said, it doesn't matter whether the displays are generated autonomously by the machine during the game's "attract" mode, or through the actions of a player during the game's "play" mode.[184] In either case, the display is copyrightable, and the copyright belongs solely to the owner of the copyright in the game code.[185]

¶60 These decisions, especially insofar as they address displays produced when games are operating all by themselves in "attract" mode, offer some clue as to how courts might decide cases involving works generated autonomously by programs like BRUTUS or the Cybernetic Poet. In all likelihood, courts would rely on the video game cases to hold that ownership of the copyright in generative code translates directly into ownership of the copyright in the works produced by it.

C. Owning the Problem of Ownership: Authors-in-Fact vs. Authors-in-Law

¶61 Notwithstanding the decisions in the video game display cases, the Copyright Act in its current form actually contains no provision pursuant to which ownership of the copyright in a procedurally generated work vests in the programmer of the generative code that produced the work. Under section 201, copyright vests initially in the author or authors of the work.[186] Although procedurally generated works have a sufficient nexus to human creativity to make them copyrightable under the reasoning articulated in the psychographic writing cases, the programmer of generative code is not the author-in-fact of the works generated by the code.[187] Harold Cohen doesn't "use" AARON to paint in the same way that he would "use" a paintbrush to paint; AARON paints.[188] But AARON and his ilk cannot own copyrights, and therein lies a problem.

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[180] *Id.* at 13.

[181] *Id.*

[182] *See, e.g.*, Stern Elec. v. Kaufman, 669 F.2d 852 (2d Cir. 1982) (involving the video game "Scramble"); Atari, Inc. v. North American Philips Consumer Elec. Corp., 672 F.2d 607, 610 (7th Cir. 1982) (involving "Pac-Man"); Williams Elec., Inc. v. Artic Int'l., Inc., No. 81-1852, 1981 U.S. Dist. LEXIS 17856 (D.N.J. June 24, 1981) (involving "Defender").

[183] *See, e.g.*, *Stern*, 669 F.2d at 856 ("The repetitive sequence of a substantial portion of the sights and sounds of the game qualifies for copyright protection as an audiovisual work."); *Atari*, 672 F.2d at 617 ("The audio component and the concrete details of the visual presentation constitute . . . copyrightable expression . . . ."); *Williams*, 1981 U.S. Dist. LEXIS 17856, at *17 ("Plaintiff has created original works in the form of a computer program and audiovisual material . . . which are subject to protection under the copyright laws . . . .").

[184] *See, e.g.*, *Stern*, 669 F.2d at 856 ("We agree with the District Court that the player's participation does not withdraw the audiovisual work from copyright eligibility."). The court articulated the distinction between the modes: "'Attract mode' refers to the audiovisual display seen and heard by a prospective customer contemplating playing the game; the video screen displays some of the essential visual and sound characteristics of the game. 'Play mode' refers to the audiovisual display seen and heard by a person playing the game." *Id.* at 854 n.2.

[185] In *Williams*, the defendant argued unsuccessfully that the player should be considered the co-author of the machine's display when the game operates in "play" mode. *See* Williams Elec., Inc. v. Artic Int'l, Inc., 685 F.2d 870, 874 (3d Cir. 1982).

[186] *See* 17 U.S.C. §201(a) (2011).

[187] Further evidence of this can be found in the fact that procedurally generated works are not fixed by the programmer. *See* Cmty. for Creative Non-Violence v. Reid, 490 U.S. 730, 737 (1989) ("As a general rule, the author is the party who actually creates the work, that is, the person who translates an idea into a fixed, tangible expression entitled to copyright protection."). The Copyright Act provides that a work may be fixed by another "under the authority of the author," but delegated fixation has been limited to "rote or mechanical transcription that does not require intellectual modification or highly technical enhancement." Andrien v. S. Ocean Cnty. Chamber of Commerce, 927 F.2d 132, 135 (3d Cir. 1991). In the case of procedurally generated art, the program's output cannot be considered a mere transcription of the programmer's code, so the programmer cannot properly be regarded as the person who fixed the work.

[188] *See* Harold Cohen, *Further Exploits*, *supra* note 158 ("AARON exists; it generates objects that hold their own more than adequately, in human terms, in any gathering of similar, but human-produced, objects, and it does so with a stylistic consistency that reveals an identity as clearly as any human artist's does. It does these things, moreover, without my own intervention.").

¶62 One way to solve this problem of ownership would be to follow the video game display cases and imply an intuitively satisfying (but analytically loose) rule: people-who-write-programs-that-make-art are authors of the art their programs make. The solution is convenient, but it sidesteps complexities relating to authorship in the age of computing—complexities that policymakers should be prepared to confront as AI continues to evolve and its products become more widely commercialized. While it is tempting to collapse the distance between the coder and the output of generative code, doing so ignores both the machinic origin of procedurally generated works and their radically mediated relationship to human authorship and creativity. This is particularly true when the works in question can easily be mistaken for human output, and the temptation is therefore great to cut the corner and attribute them directly to a human agent.[189]

¶63 Instead, we should consider how copyright law's current provisions might be modified to explicitly address ownership of rights in AI authored works. The derivative work doctrine and the work made for hire doctrine are good points of entry for considering how (and in whom) ownership of the copyright in such works should vest. For reasons I will explain fully below, neither doctrine in its current form provides a perfect fit. Of the two, however, the work made for hire doctrine can be more easily modified without undue collateral expansion of the scope of copyrightable subject matter. The work made for hire doctrine also avoids the predicament of vesting rights in a machine—a problem the derivative work doctrine cannot get around.

¶64 The statutory definition of "derivative work" is expansive, encompassing any work "based upon one or more preexisting works" and any form in which a preexisting work is "recast, transformed, or adapted."[190] If a procedurally generated work can be said to be based upon or adapted from the generative code that produced it, then the work would appear to be classifiable as a derivative work of the code. As courts have interpreted the term, however, a derivative work must contain material taken from the preexisting work.[191] Procedurally generated works do not meet this criterion, because they do not actually incorporate any of the code that produces them.[192] They are not copied from the underlying code, and they are not substantially similar to the underlying code.[193] Given the state of the case law, the only way to bring procedurally generated works within the scope of the derivative work right would be to expand the definition of derivative work to encompass works that do not borrow from the original work. Yet such an expansion in the scope of the derivative work right would be both practically unworkable and normatively undesirable.[194] It is already difficult to limit the statute's broad definition of the derivative work right, particularly in the digital environment; removing the requirement of actual borrowing would unduly exacerbate existing boundary problems, making a wider range of conduct actionable as infringement and potentially inhibiting creativity.[195]

¶65 In addition, treating procedurally generated works as derivative works would not solve the ownership problem because such a classification would not automatically make the owner of the

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[189] *Cf.* Arthur R. Miller, *Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?*, 106 HARV. L. REV. 977, 1071 (1993) ("And it should require little, if any, adjustment in most copyright systems to attribute the authorship of such a work to some human . . . even if the machine is responsible for most or all of the effort involved in creating the work.").

[190] 17 U.S.C. § 101 (2011) (defining "derivative work").

[191] *See, e.g.*, Montgomery v. Noga, 168 F.3d 1282, 1292 (11th Cir. 1999) (stating that "[t]o constitute a violation of section 106(2), the infringing work must incorporate a portion of the copyrighted work in some form"); Alcatel USA, Inc. v. DGI Technologies, Inc., 166 F.3d 772, 787 n.55 (5th Cir. 1999) ("[T]o violate clause (2), the infringing work must incorporate a sufficient portion of the pre-existing work . . . ."); Litchfield v. Spielberg, 736 F.2d 1352, 1357 (9th Cir. 1984) (requiring an infringing work to "incorporate in some form a portion of the copyrighted work").

[192] *See* Samuelson, *supra* note 157, at 1215 (making the point that computer-generated works generally do not incorporate expression from the underlying program or from the database on which the program draws to generate material).

[193] In order to infringe the derivative work right, the defendant's work must be substantially similar to the preexisting work from which it was allegedly derived. *See* Vault Corp. v. Quaid Software, Ltd., 847 F.2d 255, 267 (5th Cir. 1988); *Litchfield*, 736 F.2d at 1357.

[194] *Cf.* Samuelson, *supra* note 157, at 1220 (arguing that computer-generated works should not be treated as derivative works of the programs with which they are produced because such treatment would create a de facto exclusive use right in the program).

[195] *See generally* Lydia Pallas Loren, *The Changing Nature of Derivative Works in the Face of New Technologies*, 4 J. SMALL & EMERGING BUS. L. 57, 76 (2000) (arguing that overbroad judicial applications of the derivative work right threaten innovation in the digital environment).

copyright in the generative code the owner of the copyright in the procedurally generated work derived from it.[196] To the extent that a derivative work is non-infringing and contains new creative material, the copyright in the new material belongs to the author of that material and not to the author of the original work.[197] Because a procedurally generated work does not actually incorporate any existing material from the generative code that produced it, the copyright in such a work would be wholly owned by the work's author (i.e., the generative code).[198] There would be, in other words, no preexisting material in the new work to sustain a copyright claim by the author of the original work, leaving a non-legal person as the only copyright claimant. This is, of course, an untenable result.

¶66 The work made for hire doctrine is a more fitting framework within which to situate the problem of AI authorship because it represents an existing mechanism for directly vesting ownership of a copyright in a legal person who is not the author-in-fact of the work in question.[199] Under the work made for hire doctrine, "the employer or other person for whom the work was prepared is considered the author."[200] While the video game display cases rely on sleight of hand (i.e., substituting the human author of the code for the machinic author of its output), the work made for hire doctrine acknowledges a disidentity between the author-in-fact (the employee or contractor) and the author-in-law (the employer or other person for whom the work was made).[201] The doctrine is a legal fiction that effectuates a policy choice to bypass the author-in-fact to vest copyright elsewhere.[202] 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.[203] It would also avoid the expedient logic that conflates the author's author (i.e., the programmer) with the actual author (i.e., the generative program).

¶67 Some common law jurisdictions outside the United States have adopted a similar approach to protecting computer-authored works. For example, the law of the United Kingdom makes express provision for copyright in computer-generated works, which are defined as works "generated by a computer in circumstances such that there is no human author."[204] New Zealand's copyright law contains the same definition.[205] The copyright in such works under both U.K. and New Zealand law vests in "the person by whom the arrangements necessary for the creation of the work are undertaken," who, like the employer under U.S. law, is "taken to be" the author for statutory purposes.[206] In Ireland, there are analogous provisions: a computer-generated work is defined as a work "generated by computer in circumstances where the author of the work is not an individual."[207]

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[196] Although the right to prepare derivative works is an exclusive right of the copyright owner, 17 U.S.C. § 106(2) (2011), derivative works are independently copyrightable by their authors to the extent that they contain new material and do not infringe copyright in any of the preexisting material they incorporate, *see* 17 U.S.C. § 103 (2011) (providing that derivative works are copyrightable and that the copyright in a derivative work is independent of copyright protection in the preexisting material).

[197] *See* 17 U.S.C. § 103 (2011).

[198] *See id.*

[199] *See* 17 U.S.C. § 101 (2011) (defining "work made for hire") and 17 U.S.C. § 201(b) (2011) (governing the initial vesting of copyright ownership in works made for hire).

[200] 17 U.S.C. § 201(b) (2011).

[201] The statute does not say that the employer or other person for whom the work was made *is* the author, only that such a person "is considered the author for purposes of this title." *Id.*

[202] This policy choice is far from universal as a matter of international and comparative law. *See generally* Robert A. Jacobs, *Work-For-Hire and the Moral Right Dilemma in the European Community: A U.S. Perspective*, 16 B.C. INT'L & COMP. L. REV. 29 (1993). It is also far from uncontroversial, and its effects on authors-in-fact have been profound and in many ways deleterious. *See* CATHERINE FISK, WORKING KNOWLEDGE: EMPLOYEE INNOVATION AND THE RISE OF CORPORATE INTELLECTUAL PROPERTY, 1800-1930 251-55 (2009).

[203] Samir Chopra and Laurence F. White have offered a complete exposition of the virtues of selectively adapting agency theory to the actions of "autonomous artificial agents," albeit outside the context of copyright law. *See* CHOPRA & WHITE, *supra* note 157.

[204] Copyright, Designs and Patents Act, 1988, c. 48, § 178 (U.K.).

[205] *See* Copyright Act of 1994, § 2 (N.Z.).

[206] Copyright, Designs and Patents Act, 1988, c. 48, § 9(3) (U.K.); Copyright Act of 1994, § 5 (N.Z.).

[207] Copyright and Related Rights Act 2000, Part I, § 2 (Act. No. 28/2000) (Ir.).

Tracking U.K. and New Zealand law verbatim, Irish law considers the author of such a work to be "the person by whom the arrangements necessary for the creation of the work are undertaken."[208] These provisions do not imply or assume a human author in the absence of one; rather, they expressly create a legal fiction of authorship by means of which copyright vests as a matter of law in a party who is not the author-in-fact. That party could be a natural person or a corporation, which can frankly be regarded as something of a machine in its own right.[209]

¶68 As the work made for hire provisions of the U.S. Copyright Act are currently drafted, however, they cannot be stretched to cover procedurally generated works. Such works do not fall under the definition of "work made for hire" in section 101(1), because the relationship between the programmer and the authoring code is not an employment relationship in the agency sense, which the Supreme Court has interpreted the provision to contemplate.[210] Nor do they fall under the definition in section 101(2), because they are not among the nine categories of commissioned works specified there.[211] The statutory definition could be amended, however, to incorporate the definition of computer-generated work from the U.K., New Zealand, and Ireland: "A work made for hire is . . . (3) a work generated by a computer in circumstances such that there is no human author of the work." If section 101 were thus amended, section 201(b), without amendment, would vest ownership of such a work in the person for whom it was prepared. [212] That person would generally be the programmer in the first instance, although one could imagine situations in which it could be either the user of the program or the programmer's employer. The determination would be in the hands of the court based on the facts of the particular case. Treating AI-authored works as works made for hire would respect the complex relationship between the creativity of the coder and the creativity of the code.

CONCLUSION

¶69 For more than a quarter century, interest among copyright scholars in the question of AI authorship has waxed and waned as the popular conversation about AI has oscillated between exaggerated predictions for its future and premature pronouncements of its death. For policymakers, the issue has sat on the horizon, always within view but never actually pressing. Indeed, to the extent that the copyright system is now in a digitally induced crisis, the causes lie primarily outside the domain of cultural production, in the domains of reproduction and distribution. To recognize this fact, however, is not to say that we can or should ignore the challenge that AI authorship presents to copyright law's underlying assumptions about creativity. On the contrary, the relatively slow development of AI offers a reprieve from the reactive model of policymaking that has driven copyright law in the digital age. The increasing sophistication of generative software and the reality that all creativity is algorithmic compel recognition that AI-authored works are less heterogeneous to both their human counterparts and existing copyright doctrine than appearances may at first suggest. AI authorship is readily assimilable to the current copyright framework through the work made for hire doctrine, which is a mechanism for vesting copyright directly in a legal person who is acknowledged *not* to be the author-in-fact of the work in question. Through this legal fiction, the

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[208] *Id.* Part II, Ch. 2, § 21.

[209] *See* Nick Montfort, *The Coding and Execution of the Author*, *in* CYBERTEXT YEARBOOK 201, 205 (Markku Eskelinen & Raine Koskimaa eds., 2003) ("Machines are already parties in interest in lawsuits every day: such machines are called "'corporations' . . . In fact [it] is difficult to imagine that modern copyright law could possibly exist for the benefit of human beings rather than for the enrichment of such machines.").

[210] *See* 17 U.S.C. § 101(1) (2011); Cmty. for Creative Non-Violence v. Reid, 490 U.S. 730, 731 (1989) (holding that the meaning of "employee" under § 101 must be determined with reference to agency law).

[211] *See* 17 U.S.C. § 101(2) (2011) (providing an exhaustive list of the categories of commissioned works that may be considered works made for hire: a contribution to a collective work, a part of a motion picture or other audiovisual work, a translation, a supplementary work, a compilation, an instructional text, a test, answer material for a test, or an atlas).

[212] *See* 17 U.S.C., § 201(b) (2011).

machinic creativity of generative code can be recognized for what it really is—something other than (but owing to) the human creativity of its coder.