COPYRIGHT LAW AND ARTIFICIAL INTELLIGENCE: EMERGING ISSUES

by KATHERINE B. FORREST*

This article discusses a topic in copyright law that is rightly receiving increased attention: the implications of artificial intelligence ("AI") on copyright law. Two areas in particular are examined in depth: authorship and ownership, and defining the actor in creating a reproduction or display of a work. This is by no means the first, second, or even the third article to be raising such issues. Rather, it is intended to add to what is becoming a robust discussion.

Certain voices have been part of the discussion already.[1] In 2017, Shlomit Yanisky-Ravid wrote a fascinating article entitled *Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3a* [Automated, Autonomous, Advanced] *Era—The Human-Like Authors Are Already Here—A New Model.*[2] Yanisky-Ravid recognized that AI systems are creative, unpredictable, independent, and may have free choice, and she identifies some of the same issues with which this article is concerned: when there is autonomous creation, who owns and who can license a work? These concepts are revisited below.

Yanisky-Ravid further argues that traditional laws of copyright are inadequate to cope with the new technology that can create art and that the copyright laws are ill equipped to accommodate this technological revolution.[3] This is debatable. She then turns to traditional concepts of copyright law when she proposes a version of a work-for-hire system, based on the view that AI serves the human users of the output, and urges that those human users should remain responsible for any consequences.[4]

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1 *See, e.g.*, works by Peter S. Menell, Shlomit Yanisky-Ravid, James Grimmelmann, Annemarie Bridy, and others cited herein.

2 Shlomit Yanisky-Ravid, *Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3a Era—The Human-Like Authors Are Already Here—A New Model*, 2017 MICH. ST. L. REV. 659, 673-74 (2017).

3 Yanisky-Ravid, *supra* note 2, at 718-20.

4 *Id.* at 707-14.

In her view, the human users who utilize AI are "information fiduciaries" responsible for their creations, and tracking those involved in creating and programming the AI defines the universe of humans accountable for a work.[5]

Slightly earlier, in 2015, James Grimmelmann wrote an article entitled *There's No Such Thing as a Computer-Authored Work—And It's a Good Thing, Too.*[6] In footnote three of that paper he gives a comprehensive overview of other articles discussing the same question.[7] He also focuses on authorship issues that can arise when a computer "generates" a work. Grimmelmann argues that computers do the bidding of humans, and are really an upgrade on the way in which pen and paper have allowed the reduction of works to tangible mediums.[8] The instant article is premised on a view different from Grimmelmann — one in which AI is fundamentally different from routine computer generated material.

There are a number of articles that similarly discuss the role of programmed computers in carrying out the creative instructions of a human — and argue that — ultimately, the human remains the author. At the conclusion of Grimmelmann's article he acknowledges "[w]e could well have artificial intelligences that are responsive to incentives, unpredictable enough that we can't simply tell them what to do, and that have attributes of personality that make us willing to regard them as copyright owners. But if that day ever comes, it will be because we have already made a decision in other areas of life and law to treat them as persons, and copyright law will fall in line."[9] He continues, stating that "their future existence is of no bearing now."[10] But, as discussed further herein, we are farther along that path than when Grimmelmann wrote his piece.

An even earlier article by Annemarie Bridy written in 2012 — a time that is now long ago and far away — also touches on these concepts. Her piece, entitled *Coding Creativity: Copyright and the Artificially Intelligent Author*, discusses the ways in which people were at that time already enabling machines to create art.[11] She traces the way in which the law had developed on these issues up to 2012, and recognized that coming were the days when software would be able to relatively autonomously produce works indistinguishable from works of human authorship. She was pre-

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5 *Id.* at 708.

6 James Grimmelmann, *There's No Such Thing As a Computer-Authored Work—And It's a Good Thing, Too*, 39 COLUM. J.L. & ARTS 403 (2016).

7 *Id.* at 403.

8 *Id.* at 404.

9 *Id.* at 414.

10 *Id.*

11 Annemarie Bridy, *Coding Creativity: Copyright and the Artificially Intelligent Author*, 2012 STAN. TECH. L. REV. 5, 26 (2012).

scient. She delves into fascinating questions concerning what it means to be a creative personality — and whether human attributes are required, and points to the future as a time when concepts of derivative works and the work-for-hire doctrine will be obviously useful.[12] Finally, it is worth mentioning an even earlier article, written in 2002 by Peter Menell, entitled *Envisioning Copyright Law's Digital Future*.[13]

Since these and other pieces, the drumbeats have been growing louder. What is clear today is that AI is "this" generation's challenge to the copyright law. As the Supreme Court reminded us in *Sony Corp. of America v. Universal City Studios, Inc.*, "[f]rom its beginning, the law of copyright has developed in response to significant changes in technology."[14] Each time technology has presented new challenges, core principles have been able to provide flexible answers.

The instant article revisits certain questions that AI presents — and suggests that these earlier voices urging us to pay attention remain an important part of a dialogue to which copyright practitioners need to listen. In 2018, what was once science fiction now straddles reality. First, this article sets forth a brief overview of how copyright law in the United States has addressed new forms of technology, particularly around questions of agency: both the agency of the author, and the agency of the actor displaying or reproducing a work.

Many practitioners recall that thirty-plus years ago there was significant debate concerning whether and how the copyright laws should be used to protect computer software. Software is written work that, at times, evinces the creativity or inspiration of its author (or authors), and is thus similar to the kind of literary work our copyright regime has long protected.[15] Yet, software serves largely utilitarian purposes and can be compared to the kinds of functional works that are the province of our patent laws.[16] Through a combination of legislative action and legal deci-

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12 Bridy, *supra* note 11, at 25-26.

13 Peter S. Menell, *Envisioning Copyright Law's Digital Future*, 46 N.Y.L. SCH. L. REV. 63 (2002).

14 464 U.S. 417, 430 (1984).

15 *See* Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240, 1249 (3d Cir. 1983) (stating 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").

16 That is not say there is no purely expressive digital art. For example, in 1992 artist and computer scientist Scott Draves created Electric Sheep, an open source and distributed generative art project that allows users to dynamically generate fractal flames referred to as "Sheep," which are incorporated into a "flock" on a main server, which itself generates new fractal flames by interpolating or combining the flock members' fractal code in a process akin to mating or breeding individual fractal flames. Raquel Acosta, *Should Lawyers Dream of Electric Sheep? Digital Art: A Dynamic Misfit in a Static System*, JOLT DIGEST (Sept. 22, 2011),

sions, we arrived at what is a now well accepted principle that software is protected — much by copyright, some by patent.[17]

Roughly twenty years ago, when the Internet really took hold as the preeminent platform for creating and disseminating content, a host of new issues arose: were digital files copyrightable at all — did they constitute a tangible medium of expression? Yes.[18] Was the mere fact of file conversion transformative? No.[19] Did broad licenses to copyrighted content, conveyed before the Internet even existed, encompass licensing for all manner of online platforms? It depended on the language of the grant of rights, but they certainly could.[20]

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http://jolt.law.harvard.edu/digest/should-lawyers-dream-of-electric-sheep-digital-art-a-dynamic-misfit-in-a-static-system.

[17] For a detailed discussion of the evolution of copyright protections applicable to computer software in the second half of the twentieth century, *see generally* Menell, *supra* note 13, at 63-98.

[18] Now, it is well-established law that digital files — for example, digital music files —are copyrightable. *See, e.g.*, A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004, 1014-15 (9th Cir. 2001) (holding, in part, that the downloading of digital music files by internet users constituted direct infringement of copyrighted musical compositions and sound recordings). "E-books" are likewise considered copyrightable digital files. *See, e.g.*, Smith v. BarnesandNoble.com, LLC, 143 F. Supp. 3d 115 (S.D.N.Y. 2015). For a thorough discussion of digital file sharing and the Internet's impact on distribution rights, *see* Peter S. Menell, *In Search of Copyright's Lost Ark: Interpreting the Right to Distribute in the Internet Age*, 59 J. COPYRIGHT SOC'Y 1 (2011).

[19] In the first case addressing the "transformative" nature of MP3 file compression, UMG Recordings, Inc. v. MP3.Com, Inc., defendant MP3.Com described its service of converting compact disc recordings into Internet-accessible MP3 files as a "transformative 'space shift.'" 92 F. Supp. 2d 349, 351 (S.D.N.Y. 2000). In rejecting this characterization, Judge Jed S. Rakoff looked to a line of cases holding the fair use defense inapplicable to the retransmission of unauthorized copies via alternative mediums. *Id.* (citing Infinity Broadcast Corp. v. Kirkwood, 150 F.3d 104, 108 (2d Cir. 1998) (rejecting the fair use defense by operator of a service that retransmitted copyrighted radio broadcasts over telephone lines); Los Angeles News Serv. v. Reuters Television Int'l Ltd., 149 F.3d 987, 994 (9th Cir. 1998) (rejecting the fair use defense where television news agencies copied copyrighted news footage and retransmitted it to news organizations), *cert. denied*, 525 U.S. 1141 (1999); Am. Geophysical Union v. Texaco Inc., 60 F.3d 913, 923 (2d Cir. 1994), *cert. dismissed*, 516 U.S. 1005 (1995); Basic Books, Inc. v. Kinko's Graphics Corp., 758 F. Supp. 1522, 1526, 1530–31 (S.D.N.Y. 1991)).

[20] *See, e.g.*, Random House, Inc. v. Rosetta Books, LLC, 150 F. Supp. 2d 613, 621 (S.D.N.Y. 2001) (holding that eBooks did not infringe Random House's aged licenses to produce works "in book form," despite possible competition between the two products). *Boosey & Hawkes Music Publishers, Ltd. v. The Walt Disney Co.* addressed whether a copyright license allows for dissemination of the licensed work through a new form of technology not specifically covered in a license. 145 F.3d 481, 486 (2d Cir. 1998) (holding that language from a 1939 license granting Walt Disney the right to use a particular musical composition in a film also permit-

More recently, as Internet usage has broadened, so have the issues: who is the actor when software allows a photograph to be "embedded" in the web feed of another site — for example, on "Twitter"? Who, under such circumstances, if anyone, is "displaying" the work? In a recent case in the Southern District of New York, the court found that embedding a photograph on Twitter did constitute a "display" for purposes of the copyright laws.[21] Does it constitute fair use if it is newsworthy? This is a fact-intensive question, yet to be decided.[22] Does strict liability for unauthorized reproduction extend to the layers of dissemination that can exist within seconds for postings on one website, picked up automatically by another? Also a question the answer to which is not yet known.[23]

I. ARTIFICIAL INTELLIGENCE

Today, these questions are increasingly complicated and they move at terminal velocity into areas that we must struggle to keep abreast. Programming sophistication combined with computing power available through the distributed[24] capacities enabled by the Internet bring us to another transformative moment: the rise of AI. This article focuses on just two such issues.

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ted the company to distribute the movie incorporating the musical composition on cassette tapes and later on DVDs).

[21] *See* Goldman v. Breitbart News Network, LLC, 302 F. Supp. 3d 585 (S.D.N.Y. 2018) (Forrest, J.).

[22] *See, e.g.*, Louise Matsakis, *A Ruling Over Embedded Tweets Could Change Online Publishing*, WIRED (Feb. 16, 2018, 5:38 PM), https://www.wired.com/story/embedded-tweets-copyright-law/ (quoting Kendra Albert, a technology lawyer and fellow at the Harvard Law School Cyberlaw Clinic concerning *Goldman*: "The news organizations still have a number of potential defenses, including fair use").

[23] *See, e.g.*, Religious Tech. Ctr. v. Netcom On-Line Commc'n Servs., Inc., 907 F. Supp. 1361, 1374 (N.D. Cal. 1995) (holding that an Internet access provider and computer bulletin board was not directly liable for copyright infringement for unauthorized copies of copyright-protected works that were made and stored on its computer while transmitting postings to the Internet). Copyright infringement is a strict liability tort and generally, intent or negligence need not be proved to establish infringement. However, courts have held that there generally must be some volitional act ascribable to the defendant. *See, e.g.*, Cartoon Network LP, LLLP v. CSC Holdings, Inc., 536 F.3d 121, 130 (2d Cir. 2008).

[24] "Distributed" in this article means not resident within one location; but rather conceptually analogous to a peer-to-peer system, in which capacity is obtained from many machines working together. With AI, this could extend to software platforms being opportunistically constructed or utilized from many machines in many places, that may or may not bear any formal relationship or affiliation to one another. Put bluntly, there is no reason they would have to be owned by the same company. In a truly distributed environment, human agents might not even be aware of the various locations of the software responsible for certain AI functionality. We know that robust distributed environments exist today.

First, AI that acts as a creator or "author" of works may lead to complex issues of ownership. Second, actions by machines best described as AI, particularly distributed AI, can invoke questions of agency: who or what actor is involved in a reproduction or a display as defined by the copyright laws? Is one actor "identifiable," can it be isolated from the acts of others, and is there a human anywhere left in the chain? Is the human so far removed as to defy legal concepts of proximate cause or real involvement? Who bears responsibility or accountability for AI's actions in such scenarios?

Before turning to these questions, it is useful to further define how a few terms will be used. AI is defined here as the ability of one or more autonomous "machines" to execute instructions, but more importantly, to make independent decisions based on rational problem solving and autonomously create solutions.[25] Human intervention is unnecessary apart from an initial act of creation. As used here, the term "machine" is considered to be a "Turing Machine" — that is, a computer. A "computer" is simply software that may reside in one or more physical locations that is able to accomplish a task through computational functions. It may be — and will likely be — distributed and residing in more than a single physical location. AI is not, therefore, simply a computer program instructed to accomplish a discrete task.

However, the primary concern of this article is not AI of the sort we have come to know in our daily lives, but rather Artificial General Intelligence (or "AGI"). AGI refers to a more advanced category whereby one or more machines are capable of acting in the absence of the sorts of explicit instructions upon which AI relies. AGI adds this concept of learning and leap-frog learning to AI. In this regard, one or more Turing machines are able to learn from prior actions how to create or improve ever more autonomous and sophisticated pathways to task completion and task innovation. Whereas ordinary AI can be programmed to perform a discrete task or tasks as well as or better than a human,[26] AGI is definitionally

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[25] John McCarthy, who coined the term "artificial intelligence" in 1956, defined the *field* of AI as "the science and engineering of making intelligent machines." *See What is AI? / Basic Questions*, Professor John McCarthy Father of AI, http://jmc.stanford.edu/artificial-intelligence/what-is-ai/index.html (last visited Oct. 30, 2018). However, there is no uniform or standardized definition of what constitutes artificial intelligence. *See* Ryan Calo, *Artificial Intelligence Policy: A Primer and Roadmap*, 51 U.C. DAVIS L. REV. 399, 404 (2017) ("AI is best understood as a set of techniques aimed at approximating some aspect of human or animal cognition using machines."). AI definitions are frequently contextual and dependent on a given system's features. *See* Yanisky-Ravid, *supra* note 2.

[26] *See, e.g.*, Pui-Wing Tam, *Daily Report: AlphaGo Shows How Far Artificial Intelligence Has Come*, N.Y. TIMES (May 23, 2017), https://www.nytimes.com/2017/05/23/technology/alphago-shows-how-far-artificial-intelligence-has-come.html (dis-

capable of performing cognitive tasks equivalent to or beyond those performed by a human.[27] AGI does not yet exist, and while the ethics and implications of its creation and the timeline for its arrival are the subject of great debate,[28] extraordinary human and financial capital are dedicated to its creation and its eventual arrival is nearly certain.[29]

What separates AGI from other machines, including less sophisticated forms of AI dependent on specific programming, is creative problem solving combined with automated, and frankly uncontrolled, intelligence creation. There are aspects of this that are — as you may well be aware — subject to much debate.

For the purpose of this article, AI and AGI machine(s) are Turing machines tasked to work on or resolve a particular issue(s); these task oriented machines are referred to as a "Tasker"; the human or machine that has assigned the task is the "Tasking Master." True, unregulated, AGI is capable of functioning as its own Tasking Master should it so choose — its capacity for true autonomy being its defining characteristic.

II. OWNERSHIP/AUTHORSHIP

To understand certain issues that AI and AGI raise with regard to ownership and authorship, it is easiest to examine the moment of a work's creation. The fundamental question is a seemingly easy one: in the context of works created by AI and AGI machines, who is the author and who is the owner of a creative work? Embedded in this is the question of whether AI and, in particular, AGI, has the ability to, or does, fundamentally transform how we analyze such issues.

Today, software is frequently used to write code — that is, not simply to record the keystrokes of a human writer, but to itself write code that adds to or becomes a software program. Such use is not particularly new

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cussing Google's DeepMind's AlphaGo's defeat of China's top-ranked player of Go, which is believed to be the most complex board game ever created).

[27] *See* Gideon Lewis-Kraus, *The Great A.I. Awakening*, N.Y. TIMES MAGAZINE (Dec. 14, 2016), https://www.nytimes.com/2016/12/14/magazine/the-great-ai-awakening.html ("Artificial general intelligence will not involve dutiful adherence to explicit instructions, but instead will demonstrate a facility with the implicit, the interpretive. It will be a general tool, designed for general purposes in a general context."); MAX TEGMARK, LIFE 3.0, at 39 (2017).

[28] *See* Tad Friend, *How Frightened Should We Be of A.I.?*, NEW YORKER (May 14, 2018), https://www.newyorker.com/magazine/2018/05/14/how-frightened-should-we-be-of-ai.

[29] *See, e.g.*, *id.* ("[E]urope's $1.3 billion Human Brain Project is attempting to simulate the brain's eighty-six billion neurons and up to a quadrillion synapses in the hope that 'emergent structures and behaviours' might materialize."); *see also Worldwide Spending on Cognitive and Artificial Intelligence Systems Will Grow to $19.1 Billion in 2018, According to New IDC Spending Guide*, IDC CORPORATION (Mar. 22, 2018), https://www.idc.com/getdoc.jsp?containerId=prUS43662418.

nor does it require AI or AGI.[30] This process of creation is defined by the human agent: human drafted code in a software program instructs that program to continue writing a pattern or sequence of code, or even to import a segment of additional code.[31] Code writing in such a context is simply automating a function that humans could perform, but that can be accomplished faster and with less error by machines. The Grimmelmann paper discussed at the outset of this article — and other authors — have rightly referred to such code replication as presenting few challenges to the copyright laws.[32]

Most frequently, the Tasking Master of such machines is a human who has established rules for writing additional code, and the answer to the question of authorship generally resides within the license grant for software with which the new code is authored. There are no particularly novel or unusual copyright issues brought into play under such circumstances, though concepts of derivative works,[33] joint works of authorship, and works-for-hire may be implicated.[34] Whether code additions are jointly or singly owned and for what time period are issues already within the wheelhouses of the sophisticated corporate IP departments most likely to confront them.

But today's world of human-defined and designed automated code writing is giving way to more intelligent code authorship. And it is here that authorship and ownership issues assume additional complexity. To understand these issues, let us consider the following scenario: a human

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30 For example, Bayou, an application developed by Rice University and funded by the Defense Advanced Research Projects Agency (DARPA), employs an artificial neural network through which it has studied millions of lines of human Java code and taught itself the "intent" behind hundreds of thousands of Java programs. Jade Boyd, *Rice U. Turns Deep-Learning AI Loose on Software Development*, RICE U. (Apr. 25, 2018), http://news.rice.edu/2018/04/25/rice-u-turns-deep-learning-ai-loose-on-software-development-2. Users can describe the type of Java program they wish to create, and Bayou writes Java code to perform the functions of the programs described by users.

31 It is well-settled law that computer programs, whether in object code or source code, can be works of authorship under the Copyright Act. *See* Apple Computer, Inc. v. Franklin Computer Corp., 714 F.2d 1240, 1249 (3d Cir. 1983).

32 *See* Grimmelmann, *supra* note 6.

33 17 U.S.C. § 101 defines a "derivative work" as "a work based upon one or more preexisting works . . . ." For a brief discussion of categorizing machine-authored works as derivative works, *see*, Darin Glasser, *Copyrights in Computer-Generated Works: Whom, If Anyone, Do We Reward?*, 2001 DUKE L. & TECH. REV. 24 (2001); *see also* Robert Yu, Comment, *The Machine Author: What Level of Copyright Protection Is Appropriate for Fully Independent Computer-Generated Works?*, 165 U. PA. L. REV. 1245, 1258 (2017).

34 For a discussion of the possibility of utilizing the works made for hire doctrine to assign authorship to computer-generated works, *see, e.g.*, Yanisky-Ravid, *supra* note 2, at 670-71; Bridy, *supra* note 11.

Tasking Master directs an AGI Tasker to create software with particular functionality and its instructions include the general command to the Tasker that it do so "in the most efficient manner." In other words, the assigned task is to reach a goal, but the manner of reaching that goal is left open-ended.

We have already seen such tasks when a computer was instructed to learn to play the strategy game Go — to do so efficiently — but the manner of completion was left to the machine. In that scenario, the machine was able to both learn to play Go in unanticipated ways, and then to play and win the game itself in unanticipated ways.[35] This is not science fiction.

Returning to the initial example above: the AGI Tasker then undertakes the project of performing its task efficiently — and it may do so from a centralized platform (that is, one AGI machine, or a "Single AGI Tasker"), or if allowed or enabled, through a hole in a preventive firewall, a distributed platform. Such distribution would mean that the single AGI Tasker has now become a "Distributed AGI Tasker." The result of the AGI Tasker's efforts may well be a software program developed from information and skills the AGI Tasker compiled from numerous diverse sources, the original ownership of which is neither tracked nor traceable.

In this example, the AGI Tasker has accomplished its task as it thought best. There is no necessary reason why the AGI Tasker would have remained with the base software platform on which it started (which is presumably licensed or otherwise owned by its Tasking Master). After all, by definition, the AGI Tasker is intelligent and learns — the depth and breadth of its intelligence may change over time, and its capacity to learn enables its independence from its human creators. The platform on which it "began" to accomplish its assigned task, so to speak, may or may not bear any relation to where it ends up.

Thus, whoever "owned" or licensed the AGI Tasker's initial host platform may or may not be related to the owner or host of the various inputs the Tasker uses to accomplish what it was assigned to do. As an intelligent machine, the AGI Tasker may decide that it can create an alternative, more suitable, platform from which it can accomplish the assigned task. The new platform may be modelled on existing platforms, either in concept or structure.

It is immediately apparent from this that whatever the AGI Tasker now creates has been complicated by its defection from its original owner/host platform. No longer can questions of authorship be easily solved with reference to the license grant for the platform on which the AGI Tasker

[35] Merrit Kennedy, *Computer Learns to Play Go at Superhuman Levels 'Without Human Knowledge'*, NPR.ORG (Oct. 18, 2017, 2:52 PM), https://www.npr.org/sections/thetwo-way/2017/10/18/558519095/computer-learns-to-play-go-at-superhuman-levels-without-human-knowledge.

began. Determining authorship and ownership of resulting software for the assigned task would now require undertaking the complicated exercise of determining the authorship and ownership of the AGI Tasker's new, self-developed platform. In this regard, there may be issues as to whether the creation of the new platform constitutes a derivative work, or whether it is a novel work. It may be that the idea embedded within the base platform is conceptually transferred to a new platform altogether; it may be that expression from a third party is in fact used but nearly impossible to trace.

In its simplest form, assuming the AGI Tasker is identifiable as a single software program (and not a compilation of several), the identification of the author and owner of its output can be traced. Thus, if its output is infringing, then there may be identifiable accountability. However, as discussed above, it is too much to expect that AGI will remain centralized. This is a fundamentally different view of AI and copyright law from the other papers mentioned above.

Instead, as just described, an AGI Tasker may function in a distributed manner — itself residing in pieces on numerous separate platforms — its intelligence may be distributed onto and drawn from many machines. Put another way, it may be that the initial AGI Tasker was resident on a single machine or through a single platform, but then "decided" that a distributed format enabled more efficient solutions. Under such circumstances, ownership issues of any resulting work become immediately more complex. And in addition, the distributed AI itself may have drawn on numerous pieces of intelligent software resident elsewhere to accomplish the task. Thus, a distributed AI machine is accomplishing a task drawn from many other distributed machines.

Yes, rules could be attempted to limit where the AGI Tasker goes and what assistance it obtains from others — to limit the distributed nature of the Tasker or of the work, for instance. However, it is important to recognize that: (1) not all humans will care about such rules, let alone adequately impose them; and (2) the AGI Tasker may develop the ability to break such rules.

Of course, authorship and ownership issues are not simply limited to the programming context. Other examples include development of crea-

tive works such as music,[36] poetry,[37] visual art,[38] journalism[39] or even fiction.[40]

Given sufficient speed and access to power and server space, the processing ability of a single or distributed AGI Tasker would enable it to quickly determine patterns for certain works that may then be translated into algorithms. Such algorithms may, in turn, be used by an AGI Tasker to create non-literal replications of these creative works. That is, new creative works.

Taking one of the above examples, one can imagine the practical and economic benefits of employing an AGI Tasker to produce a work of genre fiction in which a story line is formulaic — a mystery, thriller, or romance novel.[41] An AGI Tasker would be capable of reviewing

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[36] *See* William T. Ralston, *Copyright in Computer-Composed Music: HAL Meets Handel*, 52 J. COPYRIGHT SOC'Y 281, 283 (2005) ("More recently, Stephen Thaler has built a machine referred to as the 'Creativity Machine' which has autonomously composed music and developed new words consistent with the rules of the English language.").

[37] "[I]n 1984, William Chamberlain programmed a computer to write poetry, and registered a copyright naming the program 'Racter' as the author, but assigning the copyright to himself and his illustrator." *Id.* at 283 (internal footnotes omitted). No litigation over the copyright validity or ownership resulted. *Id.*; *see also* Samuel Gibbs, *Google AI Project Writes Poetry Which Could Make Vogon Proud*, THE GUARDIAN (May 17, 2016, 7:01 AM), https://www.theguardian.com/technology/2016/may/17/googles-ai-write-poetry-stark-dramatic-vogons (discussing how Google, Stanford University and others are working on an AI program that will write poems after exposing the program to novels).

[38] For example, the Art and Artificial Intelligence Lab at Rutgers University created deep neural networks called Generative Adversarial Networks and Creative Adversarial Networks. The former was taught to replicate existing works and the latter is capable of generating work outside of known artistic styles. Sarah Cascone, *AI-Generated Art Now Looks More Convincingly Human Than Work At Art Basel, Study Says*, ARTNET.COM (July 11, 2017), https://news.artnet.com/art-world/rutgers-artificial-intelligence-art-1019066.

[39] *See* Lin Weeks, *Media Law and Copyright Implications of Automated Journalism*, 4 NYU J. INTELL. PROP. & ENT. L. 67, 87 (2014) (discussing automated journalism algorithms designed to mimic the human process of writing, a form of AI); *see also* Will Oremus, *The First News Report on the L.A. Earthquake Was Written by a Robot*, SLATE (Mar. 17, 2014, 5:30 PM), http://www.slate.com/blogs/future_tense/2014/03/17/quakebot_los_angeles_times_robot_journalist_writes_article_on_la_earthquake.html.

[40] *See* Alison Flood, *Computer Programmed to Write Its Own Fables*, THE GUARDIAN (Aug. 6, 2014, 9:11 AM), https://www.theguardian.com/books/2014/aug/06/computer-programmed-to-write-fables-moral-storytelling-system (discussing the Moral Storytelling System, a program taught create very simple fables with clear morals).

[41] The market for generic genre fiction is significant, as evidenced by "content creation companies" such as author James Frey's Full Fathom Five. Frey's company hires human authors and pays them a small, fixed amount (as little as $250)

thousands of such works, their sales information and media and reader reviews, and producing a non-literal replication containing the kinds of themes, tropes, and conventions of the most successful works within that genre. An AGI Tasker could even digest other forms of media and news, and from these not just replicate successful works, but intuit coming trends. From this, a host of copyright issues could arise. There are many instances in which copyright owners have challenged a work based on sufficient similarities with existing works.[42]

In the AGI Tasker context, such challenges could be even more complex. Who is the literal "author" of the work? How many authors are there? We know that today, for a work to be copyrightable, it must be created by a human.[43] But machine ownership of copyright rights, despite having been the subject of debate for more than fifty years, remains an open question.[44] Proposed solutions for how to treat machine-authored works range from having them enter the public domain,[45] to having the rights pass to the computer's user,[46] and even to eventual machine ownership.[47] None of these choices are clear — and the method of creation makes the right answer all the less straightforward. But the ultimate question of accountability requires there be an answer.

Even if threshold questions of ownership were settled, there still would not be an author to depose to determine where the idea originally came from, or whether the expression is typical of a prior pattern writing

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for a completed book within a contracted-for deadline. Its authors receive between 30% and 40% of all revenue, but the company owns the copyright and the writer retains legal liability for the work. Suzanne Mozes, *James Frey's Fiction Factory*, NEW YORK MAGAZINE (Nov. 12, 2010), http://nymag.com/arts/books/features/69474.

[42] *See, e.g.*, Arnstein v. Porter, 154 F.2d 464 (2d Cir. 1946).

[43] *See* U.S. COPYRIGHT OFFICE, COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICES §§ 306, 313.2 (3d ed. 2017) ("To qualify as a work of 'authorship' a work must be created by a human being."); Burrow-Giles Lithographic Co. v. Sarony, 111 U.S. 53, 58 (1884).

[44] *See* Pamela Samuelson, *Allocating Ownership Rights in Computer-Generated Works*, 47 U. PITT. L. REV. 1185, 1192 (1986) ("As early as 1965 the Register of Copyrights expressed concern about whether a computer could own rights in computer-generated works.").

[45] *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).

[46] *See* Samuelson, *supra* note 44, at 1204.

[47] *See* Grimmelmann, *supra* note 6, at 414 (arguing against computer authorship in the immediate future, but acknowledging, "[i]t is possible that some future computer programs could qualify as authors. We could well have artificial intelligences that are responsive to incentives, unpredictable enough that we can't simply tell them what to do, and that have attributes of personality that make us willing to regard them as copyright owners.") (internal citation omitted).

style. And who would bear legal responsibility for having infringed on the property rights of another, human author? Who would be the defendant in the lawsuit?

As Yanisky-Ravid proposed, where the Tasking Master is human, the work-for-hire doctrine provides a viable model for apportioning benefits of and liability for works authored by AGI Taskers at the direction of human Tasking Masters.[48] Under the work-for-hire doctrine, in an exception to the general rule that a copyright to a work belongs to its author(s), an employer owns the copyright to work authored by an employee within the scope of his or her employment or a work otherwise specifically commissioned.[49] AGI Taskers owned or licensed and directed by human or corporate Tasking Masters could function much as human employees do, and the extension of the work-for-hire doctrine to such non-human actors is intuitively appealing.

However, when a distributed AGI acts as its own Tasking Master, the work-for-hire doctrine is a less comprehensive solution. There will very likely come a point when the AGI Tasker is not one software program executing on instructions, such as "create a work," but is rather a set of distributed programs, each responsible for a contribution to the larger work. Determining where responsibility lies may result in allocation questions with which we are unfamiliar.

A simple scenario illustrates this point: imagine a computer program that can ask other computer programs to assist it in analyzing creative works, and contributing something to the creation of a new one, and imagine that this process can occur incredibly quickly and with little or no opportunity for human intervention. The new work comes into existence and is a joint work of many AGI Taskers, operating at the direction of an AGI Tasking Master (that may or may not be distributed). Even in the simplest of such scenarios where the work is plainly non-infringing, the copyright questions concerning ownership and how incentives to originate creative works will have changed.

What is the solution for this? There is no single solution, and it is a fool's errand to look for a simple and obvious one. How AI will develop is quickly evolving; the possibilities are quickly emerging.[50] The point is that we must be vigilant, we must not assume the solutions will be easy, and we must not assume that our old paradigms will apply. Copyright practition-

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48 *See* Yanisky-Ravid, *supra* note 2, at 670-71.

49 *See* Cmty. for Creative Non-Violence v. Reid, 490 U.S. 730, 737 (1989) ("If the work is for hire, 'the employer or other person for whom the work was prepared is considered the author' and owns the copyright, unless there is a written agreement to the contrary." (quoting 17 U.S.C. § 201(b))).

50 One of my favorite phrases when I was a judge on the bench was "step by step" — and that is wisely applied here.

ers must be "all over this issue" — it is very likely that we will all be dealing with the complexities of ownership and authorship within the decade. The key issue is to remain vigilant to ownership of the AGI — and to insure instructions keep the AGI as much as possible within the walls of a defined structure. Distributed AGI will be very hard to control indeed.

III. REPRODUCTION AND DISPLAY

We now turn to another area where AI challenges our traditional concept of who is the actor for copyright purposes: the display and reproduction of works initiated not just by a piece of software, but by an AI or AGI machine.

Over the past twenty-plus years, digital technologies have fundamentally transformed the steps and level of human interaction involved in reproduction — that is, copying or displaying a work. In what one might refer to as the "olden days," reproduction involved the literal duplication of a work, say, on a copying machine or printing press. A human handled the work and manipulated the tools for the copying process. Those days are largely gone, and such antiquated methods of reproduction have given way to various forms of automation.

More recently, a number of copyright cases have tested the extent to which automation in copying and displaying a work mitigates human responsibility for infringement. Basic copyright principles have thus far prevailed. These cases share a common characteristic, however: human involvement in determining the model that would be used to copy or display the work. Human decision-making played a central role with machines designed to execute.

In 2014, the Supreme Court resolved such a challenge in *American Broadcasting Companies, Inc. v. Aereo, Inc.*[51] Aereo sold a service that allowed its subscribers to watch television programs over the Internet at approximately the same time they were broadcast over the air. The subscriber chose from a menu of television shows, but the remainder of the process occurred without additional human intervention.[52]

The Court found that Aereo infringed on the exclusive rights of the copyright owners by selling a technologically complex service.[53] It was not persuaded to shift responsibility away from Aereo simply because the system depended on human interaction to trigger operation of the provider's (Aereo's) equipment.[54] In this context, Aereo was not simply an equipment provider but actually "performed" the work.

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51 134 S. Ct. 2498 (2014).
52 *Id.*
53 *Id.*
54 *Id.* at 2504.

More recently, in *Goldman v. Breitbart News Network, LLC*,[55] the court found that Defendants had violated Plaintiff's exclusive display right when they programmed software to automatically call up a copyrighted image that resided on a third party's (Twitter's) server, and displayed it on a user's terminal.[56] It was undisputed that none of the defendant news outlets had downloaded the copyrighted image.[57] Rather, each defendant simply utilized code that enabled the image to be automatically embedded on a webpage.[58]

These cases give us only a preview of a far more complicated world on the horizon. There will be a time when an AGI Tasker may be the actor; the AGI Tasker may be distributed, resulting in indeterminate corporate ownership. The AGI Tasker may determine that a particular work can or should be displayed and may be able to place embedding software (for instance) in a website, pull a work in from another, and make it available to third parties for viewing. The same may be done for reproduction, one work pulled by way of peer-to-peer like instructions, from various peers.

No doubt there will be instances in which the responsibility for such decision-making may nonetheless be traced back to a company or human that owns, manages, or controls the AGI Tasker. But such decision-making shall become increasingly attenuated from centralized involvement and thus from traceability to any human or corporation.

Rules may be imposed to attempt to limit the extent to which an AGI Tasker "reaches outside" of itself for assistance, but even those rules are subject to being discarded by the AGI Tasker, or ignored by the human programmer. Distributed involvement could lead to participation in reproduction or display by numerous nearly untraceable entities. But we are not without solutions: we can, for instance, trace IP addresses, and tease apart the point of origination. Or, it may be that this will be so time consuming and quixotic that ever more sophisticated software protections on the front end that lock down works must be developed. In other words, once a work has been let loose, it may be hard to recapture — so the play will be in keeping it from getting loose.

A lack of ability to control reproduction and display leads to a lack of control over essential aspects of the bundle of rights conveyed by the copyright. There is ultimately at least a short-term economic issue of skewed incentives: a lack of ability to control reproduction or display could lead to

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55 302 F. Supp. 3d 585 (S.D.N.Y. 2018) (Forrest, J.).

56 *Id.* at 586.

57 *Id.* at 587.

58 *Id.* ("None of the defendant websites copied and saved the Photo onto their own servers. Rather, they made the Photo visible in their articles through a technical process known as 'embedding.'").

lessened willingness to undertake the costs of creation. Reduced incentives to create lead to reduced innovation.

Again, as with authorship and ownership, what is the answer to all this? Are our copyright laws able to keep up? As this article argues that they are and they always have. We must watch for small instances of what will become a tsunami of actions taken by new and exciting technology. We must remain abreast of these developments, think about them, and seek to understand them. Or, simply take it "step by step."

PART II

ARTICLE