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Randomness, AI Art, and Copyright

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RANDOMNESS, AI ART, AND COPYRIGHT ♦

RICHARD H. CHUSED *

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INTRODUCTION

May art works created with the assistance of artificial intelligence (“AI”) tools typically be copyrighted? I posit that they may. The extant academic literature on the question is somewhat split, though virtually all agree that if an artificial intelligence “organism” reaches the point of being able to create another artificial intelligence “organism” capable of making its own independent creative decisions from the start to the finish of a project, access to intellectual property protection may fail. Some form of human agency must be present to conclude that an “author” is

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responsible for the creation of a work.¹ Various positions, however, are taken in this literature. Along the analytical spectrum there are essays more² and less³ favorable to allowing copyright law to operate.

Those who contend that art created with the assistance of AI tools are not copyrightable often base their arguments not only by claiming that the unpredictability or randomness of AI-assisted creations lack human intervention but also by claiming that such randomness removes the connection between human creativity and the fixation of a work. However, many works of art created by humans in recent decades intentionally capitalize on the concept of randomness and the vitality it invokes in a fixed work. If these are subject to copyright, then certainly AI-assisted art may be similarly subject to copyright.

I am among those generally favoring copyright protection. But the approach taken in this essay is different from other attempts to resolve the human agency and fixation conundrums. Virtually all art, including works created using technology, embody a certain degree of randomness, from the slow deterioration of traditional pigments and other materials used in art-making for centuries, to the intentional creation of random

¹ The presence of an author is required both by the United States Constitution, U.S. CONST. art. I, § 8, cl. 8 (granting Congress the power "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries) and by the Copyright Code, 17 U.S.C. § 102(a) (2021) (emphasis added) (providing that "[c]opyright protection subsists, in accordance with this title, in original works of *authorship* fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device.").

² See, e.g., Jane C. Ginsburg & Luke Ali Budiardjo, *Authors and Machines*, 34 BERKELEY TECH. L.J. 343 (2019); Nina I. Brown, *Artificial Authors: A Case for Copyright in Computer-Generated Works*, 20 COLUM. SCI. & TECH. L. REV. 1 (2018); Kalin Hristov, *Artificial Intelligence and the Copyright Dilemma*, 57 IDEA 431 (2017); 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 (2017) (suggesting that the existing copyright system needs to be reimagined in the AI era and that analogizing AI machines to workers-for-hire provides an acceptable new path). See also JANELLE SHANE, YOU LOOK LIKE A THING AND I LOVE YOU: HOW ARTIFICIAL INTELLIGENCE WORKS AND WHY IT'S MAKING THE WORLD A WEIRDER PLACE 233 (2019). Shane, an expert in artificial intelligence, takes the position that AI art may best be described as "AI-aided" but deeply curated by human agency. *Id.* at 230–33.

³ The best article casting doubt on copyrightability is by Daniel Gervais. Gervais does not suggest that all computer-based intervention in the process of creating art bars protection. Rather, he makes the claim that some artificial intelligence systems relying on large data bases may absorb an array of knowledge and make decisions independently of human intervention at the time the decisions are made. The more independent the decisions, the less appropriate is the award of a copyright according to Gervais. Accordingly, once a decision becomes programmatically detached from human agency the resulting work should not be copyrighted. See Daniel J. Gervais, *The Machine as Author*, 105 IOWA L. REV. 2053 (2020). See also Tim W. Dornis, *Artificial Creativity: Emergent Works and the Void in Current Copyright Doctrine*, 22 YALE J.L. & TECH. 1 (2020) (suggesting that AI art falls in a void in current law and provides several mechanisms for creating some sort of protection); Patrick Zurth, *Artificial Creativity? A Case Against Copyright Protection for AI-Generated Works*, 25 UCLA J.L. & TECH. 1 (2021); Garrett Huson, *I, Copyright*, 35 SANTA CLARA HIGH TECH. L.J. 54 (2018).

aesthetic outcomes by artists, to the unpredictable outcomes of art created using technological tools. By utilizing the random qualities of a selection of traditionally recognized and well-known artworks as analytical baselines, I make the claim that protecting most art resulting from use of AI is often easier than determining the copyrightability of quite standard artistic endeavors undertaken in the past.

My thinking about randomness as an artistic property that has long been protected as expressive and creative began to germinate several years ago when, on Thursday, October 25, 2018, a painting created with the assistance of an artificial intelligence tool went up for public auction at Christie's.⁴ It sold for the then-stunning price of \$350,000. Auction fees raised the total cost for the anonymous phone bidder to \$432,500.⁵ Even the "experts" at Christie's were taken aback. The initial projected value set was \$7,000 to \$10,000. The painting, titled *Edmond de Belamy, from La Famille de Belamy* created by the technology-oriented art collective Obvious, is displayed below.⁶



Image © Obvious
Portrait of Edmond Belamy, 2018, created by GAN
 (Generative Adversarial Network) (2018).

⁴ Gabe Cohn, *AI Art Sells at Christie's for \$432,500*, N.Y. TIMES (Oct. 25, 2018, 7:40 PM), <https://www.nytimes.com/2018/10/25/arts/design/ai-art-sold-christies.html> [<https://perma.cc/2KCE-FAMJ>]. Other AI pieces sold privately before the auction, including one made by the same collective that created the item sold by Christie's. See *id.* For more background on the creation of the auctioned work, see Andrés Guadamuz, *Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works*, INTELL. PROP. Q., https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2981304 [<https://perma.cc/EMV8-966H>] (Feb. 20, 2018).

⁵ Cohn, *supra* note 4.

⁶ *Is Artificial Intelligence Set to Become Art's Next Medium?*, CHRISTIE'S, <https://www.christies.com/features/A-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx> [<https://perma.cc/5WG2-NGWC>] (with a credit under the image to Christie's); see also Cohn, *supra* note 4.

When Christie's posted its precis online⁷ introducing the work to the bidding public, it perversely managed to craft the baseline for this essay, for which I give thanks. On the wall label posted next to the painting during its pre-auction public display, Christie's noted, tongue firmly planted in cheek, that the sitter for the work was Edmond Belamy. The auction house went on to remind onlookers, however, that the signature of the "artist" at the bottom right of the canvas was an algorithmic formula:

$$\min_G \max_D \mathbb{E}_x [\log(D(x))] + \mathbb{E}_z [\log(1 - D(G(z)))]$$

In fact, no sitter posed for the picture. In describing the work Christie's declared, "This portrait, however, is not the product of a human mind. It was created by an artificial intelligence, an algorithm defined by that algebraic formula with its many parentheses."⁸ Hugo Caselles-Dupré, one of the principals involved in creating the Generative Adversarial Network ("GAN") involved in making the painting, is quoted by Christie's as saying:

The algorithm is composed of two parts . . . on one side is the Generator, on the other the Discriminator. We fed the system with a data set of 15,000 portraits painted between the 14th century to the 20th. The Generator makes a new image based on the set, then the Discriminator tries to spot the difference between a human-made image, and one created by the Generator. The aim is to fool the Discriminator into thinking that the new images are real-life portraits. Then we have a result.⁹

There are many other AI systems as well, including one also described by Christie's in its *Belamy* precis as a Creative Artificial Network ("CAN") developed at the Art and Artificial Intelligence Lab at Rutgers University: "The basic binary hokey-cokey¹⁰ is the same—maker and judge, artist and critic—but CAN is specifically programmed to produce novelty, something different from what it sees in the data set, which in this case consists of all manner of paintings from the 14th century on."¹¹

⁷ *Is Artificial Intelligence Set to Become Art's Next Medium?*, *supra* note 6.

⁸ *Id.*

⁹ *Id.*

¹⁰ *Id.* The use of "hokey-cokey" is an accurate quotation. It means, according to a Google definition search using Oxford Languages as the source, "a group dance performed in a circle with a synchronized shaking of the limbs in turn, accompanied by a simple song." Americans would say, "hokey-pokey."

¹¹ *Id.*

Since the software looks for novelty rather than similarity it tends to produce work that appears more modern than the GAN compositions.¹²

But both systems, and others as well, involve the storing of large numbers of images upon which an algorithm operates to produce new compositions. Other tools use historical references as a “fact set” for the operation of algorithms but attempt to minimize human curation of the output products.¹³ And still others are designed to make compositions modeled on precisely one painting,¹⁴ a new painting imitating the style of a well-known artist,¹⁵ or an image from a model, object, or set of models or objects.¹⁶ Despite the sophistication of modern computer technology, the hope of creating AI art tools without reference to prior images or human experience is highly unlikely to be successful in the near term. Every person or team crafting such computer-based tools inevitably operates with historical references in mind, whether based on prior artistic works or contemporary aesthetic notions that are extremely difficult, if not impossible, to segregate from the algorithms that coders create.¹⁷

¹² But, truth be told, the GAN images in the Belamy series have many modern characteristics. The Christie’s precis contains an image of the entire family tree of AI images. All the pictures contain the same sort of blurry blotches and unpainted canvas areas.

¹³ See Jessica L. Gillotte, *Copyright Infringement in AI-Generated Artworks*, 53 U.C. DAVIS L. REV. 2655, 2657–65 (2020) (explaining that using prior works to create a knowledge base does not infringe copyright because of the fair use doctrine).

¹⁴ Rembrandt’s famous *The Night Watch*, part of the collection of the Rijksmuseum in Amsterdam, was originally painted in 1642. In 1715, it was cropped on all four sides so it would fit in a space of the then-new Town Hall. The museum wanted to show viewers what it looked like in its original form. A computer system was fed the remaining part of the original painting pixel by pixel. The museum also had a badly made copy of the original, complete work, saved in a computer. Then a museum scientist using a relatively new technology (convolutional neural network) reconstructed the missing pieces in Rembrandt’s style. Nina Siegal, *Rembrandt’s Damaged Masterpiece Is Whole Again, With A.I.’s Help*, N.Y. TIMES (June 23, 2021), <https://www.nytimes.com/2021/06/23/arts/design/rembrandt-night-watch-artificial-intelligence.html> [<https://perma.cc/Z7E3-NSRG>]. So, in this case, the AI system data set contained only two paintings and the goal was to complete one of the works by using Rembrandt’s style to make a “proper” version of the cropped segments of the original so they could be placed next to the incomplete work hanging in the Rijksmuseum. *Id.*

¹⁵ The Next Rembrandt is a project that has produced a new work in the style of the famous painter. See ING, *The Next Rembrandt*, <https://www.nextrembrandt.com> [<https://perma.cc/JL9E-FXFK>].

¹⁶ See, e.g., Ahmed Elgammal, *The Robot Artists Aren’t Coming: Artificial Intelligence Is Making Machines More Creative—But Machines Don’t Make Art*, N.Y. TIMES (May 27, 2021), <https://www.nytimes.com/2020/05/27/opinion/artificial-intelligence-art.html>

[<https://perma.cc/W587-JU6E>]. This news article is about Ai-Da, a robot that uses facial recognition software and a robotic arm to copy what is “seen.” *Id.* It is a combination of artificial intelligence and robotic science. *Id.* See also Pindar Van Arman, CLOUD PAINTER, www.cloudpainter.com [<https://perma.cc/4THY-VW3D>]. Arman has posted a number of interesting videos on his site about his AI-painting robot, CloudPainter. See Pindar Van Arman, *Painting Robots and the Artificial Intelligence Behind Their Creativity*, YOUTUBE (April 5, 2017), <https://www.youtube.com/watch?v=GrEttzMCneo>. In my view, CloudPainter is a much more sophisticated AI-painting robot than the one that created *Portrait of Edmond Belamy*.

¹⁷ The impact of human experience on algorithm development has become a matter of serious controversy as more evidence emerges of the ways search systems “unconsciously” use race, gender, and other human characteristics unfairly in producing lists of “hits.” See, e.g., Cade Metz, *Who Is Making Sure the A.I. Machines Aren’t Racist?*, N.Y. TIMES (Mar. 15, 2021),

Given my sense that removing human agency from artificial intelligence involved in creation of art is unlikely, Christie's statement that the auctioned *Belamy* painting was "not the product of a human mind" led me to contemplate the fundamental nature of AI art. "Of course, that Christie's statement is wrong," I mentally pontificated. For up to this point, virtually all, if not all, compositions resulting from use of AI tools have involved human intervention in the creation of the "organism" leading to the appearance of an image followed by some human curation and selection of desirable results. That structure has been the focus of extant analysis of the AI art puzzle: when do the technological contours of a work move so far beyond the participation of human thought and action that it is no longer attributable in any significant, cognizable fashion to a human actor and therefore loses its links to human agency?

While the Copyright Office guidelines say that works produced by computers are without access to intellectual property law protection,¹⁸ and that the lack of human agency renders works made "solely" by animals highly unlikely to be copyrightable,¹⁹ neither guideline grapples

<https://www.nytimes.com/2021/03/15/technology/artificial-intelligence-google-bias.html>
[<https://perma.cc/6T7N-HMAG>].

¹⁸ U.S. COPYRIGHT OFFICE, COMPENDIUM OF U.S. COPYRIGHT OFFICE PRACTICE § 306 (3d ed. 2021) provides:

The copyright law only protects "the fruits of intellectual labor" that "are founded in the creative powers of the mind." *Trade-Mark Cases*, 100 U.S. 82, 94 (1879). Because copyright law is limited to "original intellectual conceptions of the author," the Office will refuse to register a claim if it determines that a human being did not create the work. *Burrow-Giles Lithographic Co. v. Sarony*, 111 U.S. 53, 58 (1884).

COMPENDIUM (THIRD) § 313.2 adds that:

[T]he Office will not register works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author. The crucial question is "whether the 'work' is basically one of human authorship, with the computer [or other device] 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.

¹⁹ There is one very well-known case about selfies taken by Naruto, a crested macaque, using a camera left unattended in the woods of Sulawesi, Indonesia by David Slater, a wildlife photographer. A suit brought by Ethical Treatment of Animals, Inc., as the next friend of Naruto to protect the animal's IP rights in pictures, failed. See *Naruto v. Slater*, 888 F.3d 420, 420 (9th Cir. 2018). The selfies had been published in a book created by Slater and Wildlife Personalities, Inc., who claimed to own the rights in the photographs. The merits were not reached, though the outcome precludes suits brought by next friends or animals. Both were found to lack standing. Below are two of the images at issue, available in Julie Carrie Wong, *Monkey Selfie Photographer Says He's Broke: 'I'm Thinking of Dog Walking'*, GUARDIAN (July 12, 2017, 10:22 PM), <https://www.theguardian.com/environment/2017/jul/12/monkey-selfie-macaque-copyright-court-david-slater> [<https://perma.cc/BAL8-JHX4>].

well with the AI art conundrum. The principal animal case, *Naruto v. Slater*,²⁰ does not discuss the possibility that an animal trainer may become so adept at teaching skills to an animal that authorship can be ascribed to the trainer. And the Copyright Office guideline barring registration of “works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author”²¹ does not resolve the question of the roles computer programmers may play as creative inputs or intervenors in implementing the generative process. Nor does the guideline satisfactorily explain why it compels a conclusion that random results generated by a series of human decisions is uncopyrightable.²²

It is these ideas that form the basis for this essay. Paintings created by AI tools often surprise those who crafted the tool. On those occasions, computations were made by the tool that used its knowledge base to generate unforeseen, if not random, associations. It is those outcomes that have led some to claim that the link between human agency and artistic results has been broken in works of AI-art. Those computations creating surprise and random results, however, typically result from the human actions creating the AI tools in the first place. In addition, many of the seemingly random outputs of AI tools are like the random motions of art works unleashed by artists but generated by forces outside of their direct control. Such random characteristics of traditional art works have existed



²⁰ *Naruto*, 888 F.3d at 420.

²¹ COMPENDIUM (THIRD) § 313.2.

²² The most recent pronouncement by the Copyright Office made no changes to its position. The office reviewed a request to register a work for the second time, once again concluding that the work—an image entitled *A Recent Entrance to Paradise*. Second Request for Reconsideration for Refusal to Register *A Recent Entrance to Paradise* (Correspondence ID 1-3ZPC6C3; SR # 1-7100387071), <https://www.copyright.gov/rulings-filings/review-board/docs/a-recent-entrance-to-paradise.pdf>. The registration was written to overtly request protection for a work that the applicant claimed was entirely created by artificial intelligence and involved no human actions. With that factual submission, there was no way the registration was going to be accepted.

for generations and contributed greatly to their originality, expression, and copyrightability.

I. BASELINE PROBLEMS OF RANDOMNESS: ALEXANDER CALDER, ROBERT RAUSCHENBERG, AND JOHN CAGE

A. *Alexander Calder, Copyright, and Random Motion*

Begin thinking about randomness in art with a widely known Jackson Pollock drip painting—a work created by flinging paint or letting it fall off a brush or a stick onto a canvas. Those actions resulted in what may appear to us as random splatters, at least at first glance. But Pollock’s flinging and dripping of paint was not *entirely* random. No one could have created *One: Number 31 (1950)*,²³ pictured below, without attempting to direct pigment to certain places or areas on the canvas. The generalized use of the entire canvas and the way paints intermesh was not crafted blindly.

There is, however, a certain amount of randomness in the results. From the time paint left the tip of a brush or stick until it landed on the canvas, the pigment was at least partially out of Pollock’s direct control. That fact has been well-known ever since his paintings first appeared in public and is why his work would be an obvious starting point to discuss randomness in widely recognized art works.



But Pollock’s work is too easy to place in the copyright pantheon. It is hard to imagine anyone successfully claiming that the partially random qualities created by flinging paint from a spot away from a canvas pushes

²³ This painting is in the Museum of Modern Art Collection in New York. I have seen it several times, and each time I look at it I am dazzled. See Jackson Pollack, *One: Number 31, 1950* (1950 painting), in MOMA, <https://www.moma.org/collection/works/78386> [<https://perma.cc/XUN5-9MTH>] (on view in *Collection 1940s–1970s*, 2019).

the resulting composition into the public domain. It is the random qualities of the technique that gives Pollock's drip paintings their expressive vitality and encourages our eyes to wander over the canvas in amazement as colors pop into view in unexpected ways. The random qualities of his results—arising from a technique that places significant limits on the boundaries of randomness in his paintings—are an essential and obvious basis for concluding that his work is original, expressive, and fixed. Essentially, Pollock's originality and subsequent fame arose from his carefully guided use of randomness.²⁴

Instead of Pollock, begin thinking about randomness and art by considering more challenging works—those in which a very substantial part of the apparent randomness is generated neither by an author nor by viewers.²⁵ The uncertainty results from forces wholly outside the direct control of any single artist or group of artists working together. Works that move are a perfect example. Alexander Calder is one of the best-known artists creating works displaying random motion. He created settings in which motion could occur within limited spatial arenas but exercised no control over the motion itself.²⁶ Pollock flung paint; Calder simply let ambient air currents create the random motion.²⁷

Calder was interested in shapes that moved for his entire life. His family provided him with his own workshop from the age of eight. In 1909, when Calder was only eleven years old, he presented his parents with the small metal duck pictured below as a Christmas gift.²⁸ It gently rocks when touched.²⁹

²⁴ CAROLYN LANCHNER, JACKSON POLLOCK 26–36 (2009); see MARY GABRIEL, NINTH STREET WOMEN 203–04 (2018).

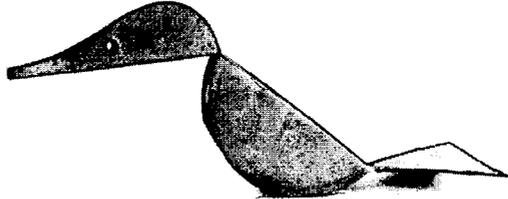
²⁵ Even in Pollock's works, the randomness is attributable to viewers in a subtle and indirect way. Our eyes move in directions that could not possibly have been predicted by Pollock. The painting technique used itself encourages randomness in the way we perceive his works. At some level, that is true of every painting ever made.

²⁶ *Introduction*, CALDER FOUNDATION, <https://calder.org/introduction/> [<https://perma.cc/W288-G3V9>]. The image is located on this site; see also James Tarmy, *How Alexander Calder Sold the World on Moving Art*, BLOOMBERG (Nov. 16, 2017, 6:05 AM), <https://www.bloomberg.com/news/articles/2017-11-16/how-alexander-calder-sold-the-world-on-moving-art?> [<https://perma.cc/2R8Z-7ZTT>].

²⁷ See Calder Foundation, *supra* note 26; see also Tarmy, *supra* note 26.

²⁸ *Id.*

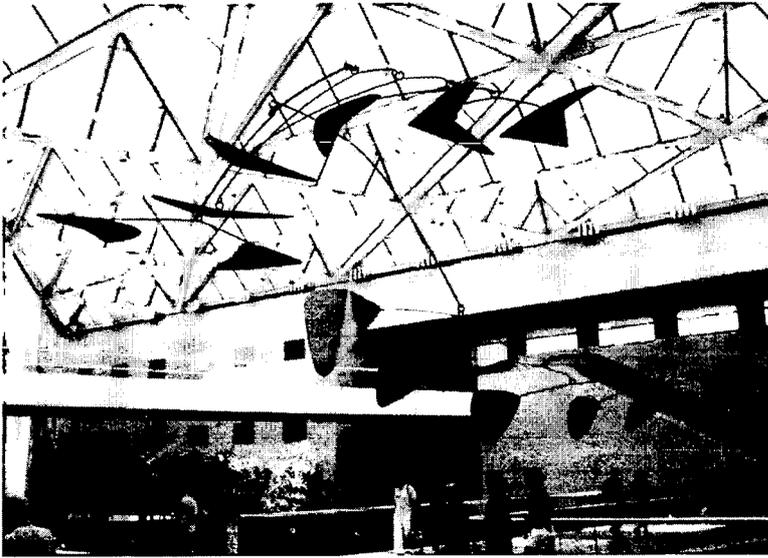
²⁹ *Id.*



Alexander Calder, *Rocking Duck Made at Age 11 in 1909*

Calder's celebrated mobiles are on display in a dizzying array of museums worldwide. The largest is an untitled work hanging in the atrium of the East Wing of the National Gallery of Art in Washington, D.C.³⁰ This massive work, with a wingspan of ninety-two feet, moves slowly, wholly dependent on shifting air currents caused by seasonal changes, air control equipment, and movement of people through the museum's spacious atrium.

³⁰ The work is undergoing preservation work. It lacks a title because Calder wanted to wait until the mobile was hung before naming it. But he died in 1976, the year before the installation occurred. Henri Matisse worked closely with Calder in building mockups of this work and suggested using lightweight honeycomb encased in thin sheets of aluminum for each piece to reduce the weight enough to allow ambient air currents in the atrium to cause the large creation to wander in space. If Calder's traditional choice of steel plate had been used, the mobile would have weighed two tons more; an electric motor would have been required to move it. *Untitled 1976*, NATIONAL GALLERY OF ART, <https://www.nga.gov/collection/art-object-page.56517.html> [<https://perma.cc/5UJT-LUXZ>]. The image may be found at Paul Matisse's website, the grandson of the famous painter Henri Matisse. *The Calder Mobile*, PAULMATISSE.COM, <https://www.paulmatisse.com/calder-mobile> [<https://perma.cc/V9RU-9LCX>]. For a video of it in motion, see Rupert Chappelle, *The Alexander Calder Mobile – East Wing of the National Gallery of Art 720p*, YOUTUBE (Apr. 30, 2011), <https://www.youtube.com/watch?v=IhGkuj5f2rI>.



While a stable version of the mobile certainly would be a copyrightable sculpture, the random motion is a critical part of the work's character and fascination. It is what causes people to stop and gaze at the work, to wonder where it will go next, to marvel at the ways such a large sculpture wanders through space. It can be mesmerizing to spend time gazing at it. Calder's intention was to create a work that drew people in by the massive and random geometry of its motion through space. That unpredictability is an essential element of its expressive qualities. Note that the copyright statute only requires that a work be fixed in a tangible medium of expression "for a period of more than transitory duration."³¹ The fact that a Calder mobile moves quite slowly still allows its form and motion within a limited range to be perceived for a period of more than transitory duration. The overall structure, shape, and direction of motion of the work is not lost to those viewing it. And, most importantly for purposes of this essay, the actual motion—a principal component of the work's expression—is itself easily perceptible.

The fixation requirement in the statute cannot mean that all motion is unprotected. Surely the condition must allow us to take the nature of human perception into account. There is a huge difference between a Calder mobile moving slowly thorough space and time, and a work moving past our field of vision so quickly that only a blur is seen. If an artist

³¹ 17 U.S.C. § 101 provides that "[a] work is 'fixed' in a tangible medium of expression when its embodiment in a copy or phonorecord, by or under the authority of the author, is sufficiently permanent or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration."

intends that blur to *be* the work, and we can perceive it, shouldn't it be deemed fixed?



Think about it this way. Consider Marcel Duchamp's well-known painting *Nude Descending a Staircase, No. 2* (1912), displayed here.³² It was an early effort to portray motion in two-dimensions. Calder's three-dimensional works put the same idea into visual motion by allowing air currents to move his mobiles. Now take the next step—a robot descending and then ascending a staircase repetitively and so quickly that all we see is a blur of motion. And assume that the blur is what the artist intends us to perceive. Isn't that motion, easily perceptible by us as a blur, fixed in a tangible medium of expression? Should there be a difference between a video of such movement showing only a blur that is

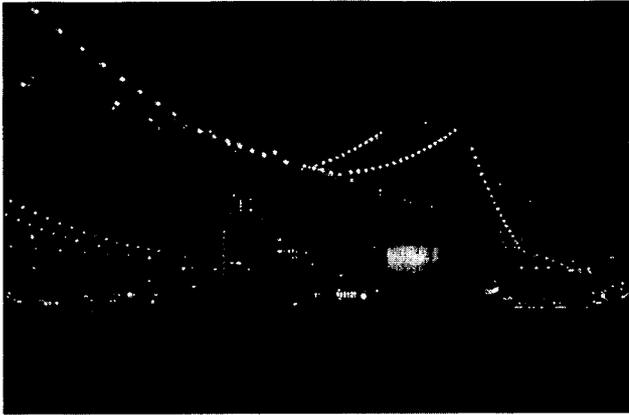
surely fixed and our own perception of a fast-moving object creating a blur that is visible so long as we are viewing the work? Isn't the intention of the artist to make a blur visible to us enough to justify calling it fixed?

Or compare the artistic installation of a waterfall like those Olafur Eliasson constructed in 2008 along the East River between Manhattan and Brooklyn. Below is an image of one of the falls under the Brooklyn Bridge.³³ The water is clearly intended to fall within a certain range of motion, much like a Calder mobile moves within limits. It was fascinating to stare at, especially at night as in this image. The creator's intention was to create an entrancing flow of motion, bringing to life and view the two-dimensional sort of "motion" pictured in Duchamp's *Nude Descending a Staircase, No. 2*.³⁴ It is a "translation" of a Calder mobile into a different medium of expression. And it, like a Calder work, is entitled to copyright protection.

³² The painting is part of the collection of the Philadelphia Museum of Art. See Marcel Duchamp *Nude Descending a Staircase (No. 2) Mini Poster*, <https://store.philamuseum.org/nude-descending-a-staircase-no-2-print/> [<https://perma.cc/76GR-37DE>].

³³ *The New York City Waterfalls*, PUBLIC ART FUND (2008), <https://olafureliasson.net/archive/artwork/WEK100345/the-new-york-city-waterfalls> [<https://perma.cc/H3XZ-XQBP>]. The photo is by Julienne Shaer.

³⁴ *Id.* See also Manny Fernandez, *Waterfalls Exit, but with Unintended Impact*, N.Y. TIMES (Oct. 12, 2008), <https://www.nytimes.com/2008/10/13/nyregion/13waterfalls.html> [<https://perma.cc/NM4T-CW6J>].



Robert Rauschenberg, *Technology, and Sound*

The painter Robert Rauschenberg is well-known not only for abstract works like all-white paintings³⁵ and combines,³⁶ but also for plowing new ground with pieces blending abstraction, imagery, technology, and motion. Two works provide worthy examples to explore—*Soundings 1968*³⁷ and *Mud Muse*.³⁸ *Soundings 1968* is a large work consisting of nine panels, each six feet wide and eight feet tall. The panels each have three plexiglass layers with two spaces in between. The outer plexiglass surfaces are silver coated and act as one-way mirrors when viewers enter the display space. When visitors make sounds, the other plexiglass pieces behind the mirrors become backlit producing various combinations of images of chairs and other items that are seen through the silver coated top layers as in the image below. The work changed its appearance in response to sounds made by viewers.³⁹ It was created with the assistance of

³⁵ See, e.g., Robert Rauschenberg, *White Painting [Three Panel]* (1951 painting), in SFMOMA (July 2013), <https://www.sfmoma.org/artwork/98.308.A-C/essay/white-painting-three-panel/> [<https://perma.cc/NDG7-RJ87>].

³⁶ See, e.g., *Combine*, MOMA, <https://www.moma.org/collection/terms/combine> [<https://perma.cc/7K25-HCGF>] (displaying three combines by Rauschenberg). Combines are mixtures of prints, collage, painting, and three-dimensional objects typically in large compositions. *Id.*

³⁷ The work is part of the collection at Museum Ludwig, Cologne. *Soundings* (1968 abstract artwork), in *Museum Ludwig, Cologne*, <https://www.rauschenbergfoundation.org/art/artwork/soundings> [<https://perma.cc/UQ7T-XNDE>]. It was shown in New York at the Museum of Modern Art in 1968–1969. See *Rauschenberg: Soundings*, MOMA, <https://www.moma.org/calendar/exhibitions/3503> [<https://perma.cc/2YME-RUSW>].

³⁸ The work is part of the collection at Moderna Museet, Stockholm. Robert Rauschenberg, *Mud Muse* (1968–71 abstract artwork), in MODERNA MUSEET, STOCKHOLM, <https://www.rauschenbergfoundation.org/art/artwork/mud-muse> [<https://perma.cc/882N-L385>]. It was displayed in New York at the Museum of Modern Art in 2017. See *Robert Rauschenberg: Among Friends*, MOMA, <https://www.moma.org/audio/playlist/40/655> [<https://perma.cc/D2MN-6TPW>]; see also Julia Halperin, *Rauschenberg's Musical Machine: The Story Behind the 8,000 Pounds of Mud Inside MoMA*, ARTNET NEWS (May 12, 2017), <https://news.artnet.com/art-world/robert-rauschenberg-mud-moma-958310> [<https://perma.cc/43YF-7CMB>].

³⁹ Mike Hovancek, *The Sound Art of Robert Rauschenberg*, EMPTY MIRROR BOOKS <https://www.emptymirrorbooks.com/thirdpage/miketx2.html> [<https://perma.cc/G3UT-W9TD>].

engineers and technicians working with Experiments in Art and Technology, an organization established by Rauschenberg and others.⁴⁰ The New York Museum of Modern Art's press release for the exhibit boldly declared:

Rauschenberg's requirement that the viewer participate in the creation of the work of art is a radical departure from the traditional relation between artist and audience. In the past Rauschenberg created works that used parts of the viewer's real world and works that required the viewer's participation. In *Soundings*, he insists that the viewer become his collaborator; without him the work does not exist.⁴¹



Rauschenberg relied upon the random actions of listeners and viewers of his work to animate them, to express the relationships between the unpredictable contours of human existence and experiencing aesthetic pleasure, dyspepsia, or ennui in everyday life as we use commonplace objects. Rauschenberg's claim that the work does not exist when there is no audience is fanciful, but it is not complete without the audible presence

⁴⁰ Press Release, MOMA (Oct. 21, 1968), https://assets.moma.org/documents/moma_press-release_326588.pdf?_ga=2.139729264.2131932810.1624282216-963339713.1623872647 [<https://perma.cc/2B9W-9KZL>]. For more about Experiments in Art and Technology, see *Experiments in Art and Technology*, MONOSKOP https://monoskop.org/Experiments_in_Art_and_Technology [<https://perma.cc/43YF-7CMB>] (May 3, 2021, 10:44 PM).

⁴¹ Press Release, MOMA, *supra* note 40. The work was slammed in a New York Times Review. Grace Glueck, *Art: Rauschenberg's Latest Bit of Technological Tinkery Bows at the Modern*, N.Y. TIMES, Oct. 24, 1968, at 95. Glueck wrote that the statement about the work not existing without the participation of the viewer is, "quite bluntly, [] as pretentious as any as you are likely to find in print, sharing the so-whatness quotient of an assertion that a darkened living room does not exist until the occupant turns on the lights. I challenge Mr. Rauschenberg to show me a work of art from the beginning of history to which his statement does not apply." *Id.* The review goes downhill from there. Such is life.

of people. The idea of expression intended by an artist to arise from the actions of others and from the ability of human beings to discern and work with aesthetic experiences, is deeply embedded in *Soundings 1968*. It exemplifies the underlying nature of copyright law's protection of original works fixed in a tangible medium of expression and the creation of incentives to draw such expression into public view. While the exact expression perceived when people experience *Soundings* is unpredictable, the work contains a highly expressive fixation of the artist's *intention* that random expression be perceived every time the work is viewed. Indeed, part of every work of art is similar, evoking varied and unpredictable reactions in viewers. Stand in the back of a gallery filled with abstract art and watch the human reactions as people come, stay, and go, or express delight, boredom, and puzzlement.

Rauschenberg's *Mud Muse* also involves a mixture of sound, motion, and technology. It was reconstructed in 2017 for a large retrospective exhibition of Rauschenberg's work at the Museum of Modern Art in New York.⁴² *Mud Muse*, originally on display from 1968 to 1971,⁴³ was a large vat filled with 8,000 pounds of mud that bubbled in response to the sounds of whatever music was played by an attached amplification system.⁴⁴ The vat, mud, and mechanical and electronic equipment were clearly fixed, though by themselves many might not consider them as an original, expressive, sculptural work. When the music was turned on, it activated a system of valves calibrated to respond to certain frequencies that would release various sized bubbles of air into the mud. When running, the mud was in constant motion and the sounds of bubbles popping

⁴² See Robert Rauschenberg: *Among Friends*, MOMA, <https://www.moma.org/calendar/exhibitions/3634> [<https://perma.cc/TLX8-BDQN>].

⁴³ *Id.*

⁴⁴ *Id.* The author recorded a brief video of the installation while visiting the retrospective. Museum of Modern Art, *Rauschenberg's Mud Muse – Part 1 / at the Museum*, YOUTUBE (May 12, 2017) <https://www.youtube.com/watch?v=Tvt-VSgPd4c>. The image in the above text is a still from the video. When experiencing the work, the sounds, aroma, and bubbles were mesmerizing. See Julia Halperin, *Rauschenberg's Musical Machine: The Story Behind the 8,000 Pounds of Mud Inside MoMA*, ARTNET NEWS (May 12, 2017), <https://news.artnet.com/art-world/robert-rauschenberg-mud-moma-958310> [<https://perma.cc/DXE4-EQQA>].

and mud plopping back into the vat are quite audible. Those characteristics are visually discernible even in a single image like the one displayed here from 2017.⁴⁵ As with much of the artistic world, the outer limits of the work's meaning must be related to the human mind's capacity to perceive what is happening and to assimilate the experience. Rauschenberg intended to elicit various, unpredictable reactions in those who watched and listened to the bubbling vat. It also is easy to imagine a work like this being built to respond to ambient sounds in a room rather than recorded musical compositions. It is, therefore, similar in many ways to *Soundings 1968*. Both could generate expressive, random responses from those who viewed them.

Indeed, without the presence of viewers in the rooms where *Soundings 1968* and the human activated version of *Mud Muse* are installed, neither work has much of an expressive character. They stand as mute reminders of what might be. Sheets of plexiglass and a vat full of mud are odd "works" of art to say the least.⁴⁶ Perhaps they are expressive. After all, if a completely white canvas is protected, why not a vat of mud?



But the core of their expression is dependent on the interaction of technology and human beings in a defined space. They become dependent on human behavior, which is inherently random.

It is that very random quality—that interaction—Rauschenberg intended to display. His intention was to turn such random interactions into aesthetic perceptions. With *Soundings 1968*, he insisted “that the viewer become his collaborator.”⁴⁷ Does that interactive randomness render the work authorless and expressionless? Hardly. The intentions of the artist are exactly what were expressed when the work was installed in a gallery. Like so much twentieth-century art, Rauschenberg's work was conceptual, that is, a work that placed people at the center of conceptualizing what the creations might signify. The mere fact that each day's or hour's

⁴⁵ I took the picture when visiting the exhibition.

⁴⁶ They still might be copyrightable as sculptural works, but they are certainly less interesting than when in action.

⁴⁷ Press Release, MOMA, *supra* note 40.

expression is different does not negate its significance. Nor does the randomness mean the work lacks fixation. As viewers moved in the space where the works were installed, they perceived the operation of the creations as expressive for a period of more than transitory duration. Such randomness can be recreated whenever viewers enter the display space—not the exact same sights or sounds but the contours of expression intended by Rauschenberg. That’s enough.

B. John Cage and Silence

John Cage may present the ultimate test of the acceptance of randomness as copyrightable expression. Take a few moments to experience John Cage’s 1952 composition “4’33” — a performance in three movements by a single musician or many sitting or standing motionless and silent for a total of four minutes and thirty-three seconds.⁴⁸ There are many videos online of events where the piece has been played.⁴⁹ Listening to the entire work is a unique experience, whether online or in person. (If you have never experienced “4’33”, go online, find a video of a performance, and watch it, preferably with friends.)⁵⁰ While those holding or sitting close to instruments do nothing physically obvious (except breathing and perhaps moving slightly) while relating in some way to the tools of their trade and to the ambient noises in the performance space, each performance is unique. The silence of the composition⁵¹ inevitably is transformed by ambient noises in the room, by the facial expressions of

⁴⁸ The length of each movement varies a bit depending on which version of the sheet music is used. The oldest extant version has segments of 30”, 2’23”, and 1’40”. In some later versions, the movements run for 33”, 2’40”, and 1’20”. For a summary see “4’33”, WIKIPEDIA [https://en.wikipedia.org/wiki/4’33”#Versions_of_the_score](https://en.wikipedia.org/wiki/4'33\) [<https://perma.cc/8BXY-FMTR>] (Oct. 2, 2021, 7:30 PM). The most commonly used version was written by Cage in 1953 and dedicated to Irwin Kremen. Its notation is described in some detail in Irwin Kremen, *On the Score of 4’33” (Original Version in Proportional Notation)*, JOHN CAGE TRUST (Jan. 28, 2012), <http://johncagetrust.blogspot.com/2012/01/on-score-of-433-original-version-in.html> [<https://perma.cc/sjh6-e5y8>].

⁴⁹ A “traditional” performance played by Kyle Shaw in 2016. Kyle Shaw, *John Cage: 4’33”*, YOUTUBE (Mar. 26, 2016), <https://www.youtube.com/watch?v=rDgHUj8sJaQ>. As Cage did the first time he played it, he lifted up the keyboard cover and closed it to demarcate the beginning of each of the three movements. For one of my favorites, see Future Workspace, *John Cage 4’33*, VIMEO (2009), <https://vimeo.com/3176013>. It shows a 2009 concert involving Future Workspace. In it, the conductor works from a timer to ensure that each of the three movements is properly played. In between the first two movements, the conductor wiped his brow, a gesture that drew a chuckle from the audience. Various ambient sounds are heard in the background and, of course, other ambient sounds will be present in any space where the video is displayed.

⁵⁰ Here is one of many examples you might use to experience the work. It is particularly humorous because the orchestra tuned itself before beginning the piece and the auditorium lights are turned off at one point. The video is from a 2017 performance at Randolph College in Lynchburg, Virginia. Randall Speer, *John Cage: 4’33” (For Orchestra and Soloist)*, YOUTUBE (Mar. 9, 2018), <https://www.youtube.com/watch?v=7wehyqv5tWc>.

⁵¹ It is worth noting that virtually all music has moments of silence, pauses, or breaks. They are a critical part of the works’ expressive qualities, creating rhythm, pace, and surprise. Listening to jazz is a revelation of silence at work.

performers and audience members in the quiet, noteless, and wordless, but charged, concert environment, by audible coughs, by some restlessness, and by an uptick in sounds during pauses between the three movements of the work. Just think of the impact of silence we all feel when stepping into an elevator filled with total strangers as it is transformed by the sounds of the fan, coughing, rustling clothes, nervous twitches, and faces avoiding each other's gaze.

Michael Zelenko explored the various human reactions to such a charged environment in a brief, but inciteful, essay posted online by the San Francisco Museum of Modern Art.⁵² Zelenko served as a part-time gallery attendant at the museum during a three-month period when the Cage work was played by different pianists in a museum gallery. His thirty-six viewings of performances produced an array of personal reactions in Zelenko, "from veneration to frustration, fascination to boredom, and finally, . . . a return to reverence."⁵³ Those present, Zelenko reported, were sometimes indifferent and made quick departures.⁵⁴ Others were rapt with attention and reflection. In one case, Zelenko described the reactions of a Swedish music professor who

stood riveted next to the piano, intensely focused during those four and [a] half minutes. Afterwards, he shared with me his theory regarding the length of the composition in a hushed tone: the 273 seconds that make up the piece are possibly a reference to -273 Celsius, or absolute zero, when all molecular motion stops, or at least reaches its minimal state, a sort of molecular silence.⁵⁵

In a related vein of putative nothingness, it was totally appropriate that the piano used to play the Cage work was placed by the San Francisco MoMA in a gallery in front of Robert Rauschenberg's *White Painting [Three Panel]* (1951). It is in the museum's large collection of works by the artist.⁵⁶ When creating the work, Rauschenberg removed as much visible evidence as he could that a human hand created it. Brush stroke marks were studiously made very difficult to discern.⁵⁷ Corinna da Fonseca-Wollheim, reviewing a 2014 exhibition focused on Cage's 4'33" for the *New York Times*, wrote:

⁵² Michael Zelenko, *John Cage: 4'33"*: Daily, OPEN SPACE (Feb. 4, 2009), <https://open-space.sfmoma.org/2009/02/john-cage-433-daily/> [<https://perma.cc/97HS-RW2G>].

⁵³ *Id.*

⁵⁴ *Id.*

⁵⁵ *Id.*

⁵⁶ See Sarah Roberts, *White Painting [Three Panel]*, SFMOMA (July 2013), <https://www.sfmoma.org/artwork/98.308.A-C/essay/white-painting-three-panel/> [<https://perma.cc/PG5M-2JRP>].

⁵⁷ *Id.*

The final nudge toward Cage's silent work came from Robert Rauschenberg, whom [Cage] met in 1951, while the artist was working on his white paintings. These smooth, monochrome canvases went a step further than Barnett Newman's "The Voice," which is also part of the show. That painting is almost entirely white, too, but the variations in brush strokes and a subtly vertical line running down one side like a scar give the viewer's eye plenty to engage with. By contrast, Rauschenberg's white paintings were not articulated in any way, Mr. [David] Platzker [the show's curator] said. "Cage recognized that what Rauschenberg had done was remove all the elements of 'art,'" he said. "And that if you put up a painting like that in a room, it's going to interact with the light and dust particles in the air."⁵⁸

White Painting [Three Panel], therefore, was an ideal backdrop for Cage's work. The painting reflected the lighting and shadowing of the display space as much or more than the hands of human endeavor. In short, art lacking standard qualities of art becomes fully understood as art because of the ways it interacts with the environment in which it is placed or performed and draws expressive activity from those who view it. That interaction is unpredictable and random. It is our reactions that give full expressive life to such works. Compare the image of the Cage performance gallery containing Rauschenberg's work in the background with Barnett Newman's *The Voice* discussed by Fonseca-Wollheim.



David Bernstein, Head of Music and Professor of Music at Mills College, demonstrating 4'33" for staff performers in early November [2008]. On the piano

Barnett Newman, *The Voice* (1950), MoMA.⁶⁰ Is the faint vertical line vastly different than the lines created by locating three

⁵⁸ Corinna da Fonseca-Wollheim, *Visual Portents of a Silent Bolt of Thunder*, N.Y. TIMES (Jan. 3, 2014), <https://www.nytimes.com/2014/01/04/arts/music/momas-there-will-never-be-silence-about-john-cage.html> [<https://perma.cc/7X6E-CN49>].

⁶⁰ Barnett Newman, *The Voice* (painting), (1950).

is the Irwin Kremen 4'33" score in proportional notation, and behind the piano is Robert Rauschenberg's *White Painting (Three Panel)*.⁵⁹ canvases next to each other in the Rauschenberg work?

In a perhaps surprising turnabout, copyright infringement litigation involving 4'33" arose. Those concluding that 4'33" is not expressive in any way for copyright purposes surely will react to such an event as preposterous. Matt Batt, a composer for the British rock group The Planets, was sued in England by the Cage estate for copyright infringement after including a piece entitled *A One Minute Silence* as track thirteen on the album *Classical Graffiti*. The work was humorously credited to "Batt/Cage." The case did not go to trial; it was settled for a six-figure sum.⁶¹ But it is not completely clear what the significance of that large payment was. When it was made, Matt Batt said:

This has been, albeit a gentlemanly dispute, a most serious matter and I am pleased that Cage's publishers have finally been persuaded that their case was, to say the least, optimistic.

We are, however, making this gesture of a payment to the John Cage Trust in recognition of my own personal respect for John Cage and in recognition of his brave and sometimes outrageous approach to artistic experimentation in music.⁶²

Batt's statement suggests that from his perspective the large payment was in significant part a gift and that he thought the actual copyright claim was weak at best.

For many, of course, the notion that silence is copyrightable is untenable. For them, there is no "there" there. 17 U.S.C. § 102(b) of the Copyright Act provides that, "In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work." Surely, the argument would go, silence is merely an "idea" or "concept" that is neither expressive nor fixed. And therefore, it cannot be an original work of authorship as required by § 102(a).⁶³

⁵⁹ Zelenko, *supra* note 52.

⁶¹ *Composer Pays for Piece of Silence*, CNN (Sept. 23, 2002, 12:21 PM), <https://edition.cnn.com/2002/SHOWBIZ/Music/09/23/uk.silence/> [<https://perma.cc/BHC7-BMS5>].

⁶² *Id.*; see also Billboard Staff, *Musician Settles Suit on Silent Piece*, BILLBOARD (Sep. 24, 2002), <https://www.billboard.com/articles/news/74099/musician-settles-suit-on-silent-piece> [<https://perma.cc/6B6E-45KJ>].

⁶³ See 17 U.S.C. § 102(a) ("Copyright protection subsists, in accordance with this title, in original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device.").

But upon reflection, that conclusion is not at all obvious. As we know from Rauschenberg's all-white compositions, as well as from those of many other painters,⁶⁴ copyright may attach to a work in which the idea of "whiteness" is expressed on canvas. In such art, it is the concept behind the work, more than the finished work itself, that is important; it is the expression drawn out of viewers that is central. If that is so, why may not other reflective aspects of human existence, like asking people to sense silence, also be protected? Motion in the abstract is ideational, but in the hands of Calder it becomes enormously expressive. It is also like Cage creating a setting in which the concept of silence is activated and expressed in the act of listening to silence itself and the human reactions it evokes.

Whether Batt infringed Cage's work, however, is another question. Making a recording of only one minute of silence, with different ambient sounds from any performance of the Cage work, may not be substantial use. It may not lead to the same tensions emanating from silence as does any performance of Cage's *4'33"*. Or, perhaps, given the humor in the title, it simply is a joke or a parody and therefore a fair use.⁶⁵ And of course, there is always an argument like one made here—that the expressive quality of Cage's work is in the human reactions it evokes, and that if such an expressive purpose was also behind Batt's work it might infringe. But regardless of how the infringement questions are answered, the underlying Cage work should be protectable, even if the level of protection is quite limited.

In fact, silence is enormously expressive when experienced. A concept like silence considered outside of any context in which it occurs is ideational. But ideas like silence, a solid color, motion, darkness, the musical note "b-flat," the letter "A," the word "nothing," or the concept of infinity may become enormously expressive when perceived in a specific setting or work of art.⁶⁶ Consider www.inbflat.net.⁶⁷ On this page, twenty small windows open. Each one contains a video of a performer doing some work played in a b-flat chord. You as the viewer of the site may click on any window in any order to get that window's performance to play. As you click on a variety of windows, music emanates from each

⁶⁴ Google, for example, some of the work of three other prominent artists—Robert Ryman, Kazimir Malevich, or Agnes Martin. For images of Ryman's work, see *Dia: Robert Ryman*, DIA ART, <https://www.diaart.org/exhibition/exhibitions-projects/robert-ryman-exhibition-94> [<https://perma.cc/U376-BU55>].

⁶⁵ See, e.g., *Campbell v. Acuff-Rose Music, Inc.*, 510 U.S. 569 (1994).

⁶⁶ You can experience the shift from idea to expression in the notion of silence the next time you have people over for dinner. At some point in the meal ask everyone to sit motionless and silently for four minutes and thirty-three seconds and then chat about what everyone perceived during the experience. Start by asking what silence sounded like.

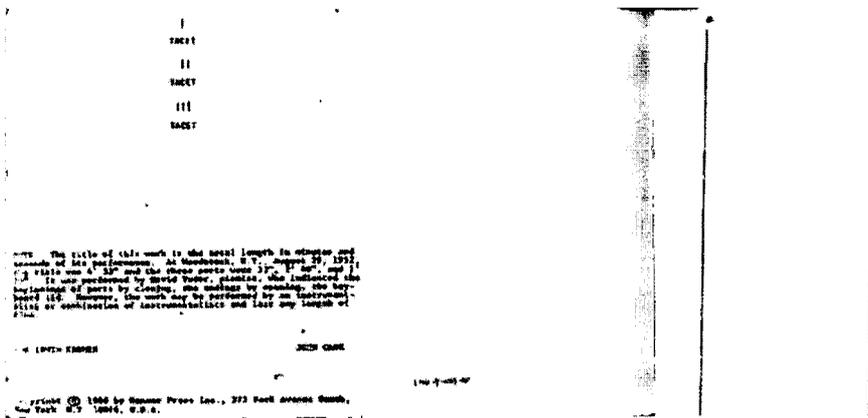
⁶⁷ IN B FLAT, <http://www.inbflat.net> [<https://perma.cc/AMN3-Z6DM>].

one. You end up creating a performance of your choosing—a random result compared to what the musicians or the creator of the webpage may have chosen themselves. Does that mean the page lacks copyright? Hardly. It means that the page was intended to express the nature of b-flat in as many of its random video variations as possible. The major problem is not that b-flat or silence in a work like John Cage's lacks expressive qualities, but that those dubious about copyright protection of his work find the expressive qualities are in large measure not predictable or fixed as to any particular performance.

But this conclusion is also erroneous. Certain aspects of 4'33" are clearly fixed. Cage himself wrote sheet music, like that pictured below.⁶⁸ The original is now lost, but he wrote others and music publishers have crafted their own versions.⁶⁹ There is, however, no prescribed way to perform the piece. Different musicians and groups of musicians interpret it in various ways. That, of course, is true of any performance of a more traditional musical work and of the b-flat website. Conductors and musicians each bring their own nuances to a piece, nuances that are not predictable beforehand. And, as noted, the audience reactions will vary at each performance of both the Cage work and a boisterous symphony like Beethoven's Ninth. In addition to Cage forcing us to think about the impact of time, it is those human reactions that he strove to emphasize in the expression of his sheet music. Like Rauschenberg's white paintings, the appearance of a single color on a canvas draws out unpredictable reactions—from laughter to deep thoughtfulness—in viewers. It gives a viewing context in which we can conceptualize the impact of a particular color on a canvas.

⁶⁸ See Kremen, *supra* note 48. The image is labeled: "Two Scoring Documents by John Cage for 4'33". (Left) I Tacet, Cage, J (1965); A Brief Descriptive Score, Indicating 3 Movements. (Right) A Proportional Score, Cage, J (1952); The Measured Spaces of the Ledger Pages Correspond to Time, as Specified in the Key on the Left Side (1 Page = 7 Inches = 56")," see David Griffin, *How to Write Silence*, TRACEY, Aug. 2013, at 4 fig.2, https://www.researchgate.net/figure/TWO-SCORING-DOCUMENTS-BY-JOHN-CAGE-FOR-433-LEFT-I-TACET-CAGE-J-1965-A-BRIEF_fig2_265597418.

⁶⁹ Kremen, *supra* note 48.



Cage's intention to force people to react to the work is a central part of its expressiveness. Irwin Kremen said this while describing the sheet music he received from Cage in 1952:

The last time I spoke with John about this score – it was in Zurich in 1991 – his face lit up with his inimitable smile, and he said, "Krem, all the notes are there." I took that to mean in a virtual sense, for how otherwise could they be there when patently they weren't! Thus, at any performance of "4'33'", as virtual notes they would underscore in effect whatever chance yields up by way of sound. Conceived as such, it's not unlike the virtual image of physical optics: in the microscope and telescope, virtual images and foci are held to occur at ideal points where no tangible part of the instrument is located.⁷⁰

While the length of each of the three movements is defined, the resonances heard are "whatever chance yields up by way of sound." Cage intended to create random human reactions—the ultimate expressive impact of the work—and that original intention is evident in the sheet music fixation of the work. There are no notes—just markings denoting periods of time. Computer programs creating unpredictable art works, of course, are also fixed in a computer before the AI engine is unleashed. Like the sounds we hear in a work of silence, the art resulting from an AI tool is often unpredictable. And those deeply involved in crafting the tools of AI-art are fully aware of the unpredictability of their efforts—from aesthetically pleasing outcomes to creative disasters.

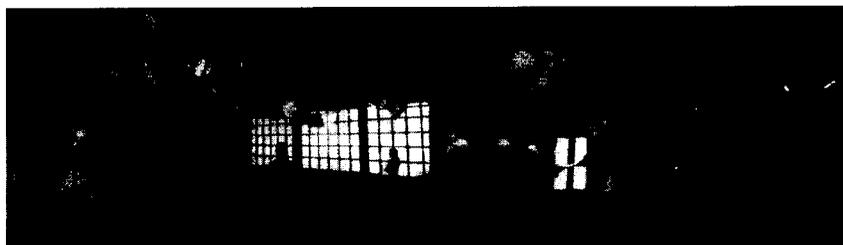
⁷⁰ Kremen, *supra* note 48.

C. Coda

The sound installation *Ambiente432* by the artist Trimpin⁷¹ is a fascinating coda to the analysis of randomness in the well-known works of art discussed so far. It has a multitude of links between the visible, the audible, and computers. It has been installed in several museums and is part of the collection of the Jordan Schnitzer Museum of Art at Washington State University in Pullman. The motion of people walking around in the room where the work is installed causes twelve speakers to move and produce sound. All twelve of the speakers play on the sound frequency 432Hz but emit different tones using that frequency. The reason that frequency was selected is described this way by the Schnitzer Museum:

Comprised of 12 motion-responsive resonator horns suspended from the ceiling and organized in strategic configurations, the installation is tuned precisely to 432Hz. Known as Verdi's 'A', this vibration frequency recurs in the tuning of ancient Tibetan singing bowls, Stradivarius instruments, and 20th century physicist W. O. Schumann calculated the Earth's rhythms at a cycle close to the fundamental frequency of 432Hz. *Ambiente432* is "played" by visitors themselves as they move through and activate the space, impacting their own immersive spatial and aural experience.⁷²

To see how it works, you should view the video cited below.⁷³



The work is a visual, three-dimensional, computer-regulated, movement-sensitive installation. There are several aspects of interest in this work—the physical appearance and location of its objects in the space,

⁷¹ Trimpin is an unbelievably talented inventor of machines, musical instruments, environments, and installations that are widely recognized around the world as the work of a very special and creative person. A long video speech he gave in 2016 is one way to begin to comprehend the scope of his genius. See Microsoft Research, *Visiting Artist Trimpin*, YOUTUBE (June 17, 2016), <https://www.youtube.com/watch?v=0bvEHoG4CUk>.

⁷² This description of the work was posted when the work was originally commissioned for installation by Washington State University. The image also is available at this site. See *Trimpin*, JORDAN SCHNITZ MUSEUM ART WSU, <https://museum.wsu.edu/events/exhibit/2018-gallery-01-pavilion-ambiente432-an-interactive-sound-sculpture/> [<https://perma.cc/72QZ-9AXH>].

⁷³ See Grace Arnis, *Trimpin Ambiente432 Horns Return to WSU*, NW. PUB. BROAD. (Feb. 12, 2020), <https://www.nwpb.org/2020/02/12/trimpin-ambiente432-horns-return-to-wsu/>.

the specific frequency, pitch, and volume of the sound emitted by each speaker, the motion of each speaker, the algorithm that operates the movement and sound of each speaker, and the computer-generated randomness of the experience created by the work as one or more people move through the space. Together, the characteristics are a textbook example of why so much computer assisted art is interesting, as well as random, expressive, and copyrightable.

Large parts of the piece meet very standard criteria for copyright protection. The speakers are tangible and visible in the display space; they are fixed. The sounds emitted by the speakers are all at the same frequency but at different pitches. As a “family” of sounds, or music if you will, they also are fixed in the settings in both the speakers and in the computer algorithms that operate the work’s motion and sounds. All of that is standard, fixed, original, and copyrightable. The unusual part for our purposes is the randomness of the speaker movements and sounds stimulated by viewers as they move about the space—a result Trimpin fully expected and intended to occur. While that randomness is certainly intended in the way he designed the installation and constructed the structure of the algorithms, it cannot be fixed in a unique way for all time in a single recording or video tape; every time the work is experienced, the result is different. That should not matter; the intentionally generated, unpredictable appearance and sounds emitted as people move through the space still is fixed, expressive, and original.

In another article⁷⁴ I argued that randomness like that in *Ambient 432* is fixed despite our inability to predict what it will do next. Thinking about Rauschenberg’s *Mud Muse* and other works, I wrote that:

Deeply important changes in our physical perceptions and understandings of the world can help us understand why . . . Rauschenberg’s *Mud Muse* [was] fixed in a tangible medium of expression. The mathematical and scientific concept of “chaos” is an important analogy. In the scientific context, “chaos” signifies a phenomenon that visually appears random but responds to established mathematical limits that vary in outcome depending on even very slight differences in initial conditions.⁷⁵ Chaotic processes often are bounded in their outer limits despite our inability to predict exactly what will happen next.⁷⁶ In many ways, chaos defines art works like those displaying [random motion] or bubbles percolating in a vat. A camera, or even our brains,

⁷⁴ Richard Chused, *Protectable “Art”: Urinals, Bananas, and Shredders*, 31 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 166, 202–05 (2020).

⁷⁵ See generally JAMES GLEICK, CHAOS: MAKING A NEW SCIENCE (2008); see also Jonathan Borwein & Michael Rose, *Explainer: What Is Chaos Theory?*, THE CONVERSATION (Nov. 18, 2012, 10:20 PM), <https://theconversation.com/explainer-what-is-chaos-theory-10620> [<https://perma.cc/GX5J-CMT7>].

⁷⁶ See Chused, *supra* note 74 (internal citations omitted).

can capture any moment, but we cannot predict precisely what will happen next.

Given “chaos’s” inherent natural variability, the well-defined nature of the mathematical concept, and the ability to capture any particular moment—why not allow an artistic use of bounded randomness, in addition to items that appear stable at the moment of viewing, to be fixed? The underlying artistic intention is just as inventive, creative, and perceptible—maybe more so—as it is in art works generally deemed “stable” despite their changing characteristics. . . . Rauschenberg’s *Mud Muse* [and *Soundings 1968*, Calder’s mobiles, and Cage’s 4’33” all] should be deemed copyrightable as changing, but bounded, works. They are among the most inventive and unusual works in the history of contemporary art. It would be unacceptable to allow anyone to come along and freely duplicate their work.⁷⁷

This theory applies to Trimpin’s work, as well as the other works of Rauschenberg and Calder discussed here. All the movements and sounds described above take place within well-defined, fixed boundaries that may be perceived for a period of more than transitory duration. The sounds and motions never gyrate beyond a perceptible boundary. The most difficult work to cabin, even assuming the validity of a chaos theory of fixation, is Cage’s 4’33”. Though the sheet music fixes the intention and expectation that random events will give the work a large part of its expressive life, these events are not bounded in the same way as in chaotic systems. If there is a boundary, it resides not in mathematical formulae buried in a computer algorithm barring events outside of mathematical limits, but in the confines of the sheet music, of each space where 4’33” is performed, the psyches of those in attendance, and the audience reactions. The randomness is bounded differently from the works of Rauschenberg and Trimpin, but it is nonetheless bounded—now by time, space, and the limitations of human experience.

As noted already, Cage’s expectations when he wrote the sheet music for 4’33” anticipated the quality of randomness that occurs when performers and an audience are asked to sit quietly for a significant period. In that sense, the work’s randomness is fixed. While the actual events occurring at a performance are not “‘fixed’ in a tangible medium of expression . . . for a period of more than transitory duration” as copyright law is typically thought to require,⁷⁸ the expectation of such randomness is. And very similar things occur in any performance of a musical work.

⁷⁷ Chused, *supra* note 74, at 204–05 (internal footnotes omitted).

⁷⁸ 17 U.S.C. § 101 (“A work is ‘fixed’ in a tangible medium of expression when its embodiment in a copy or phonorecord, by or under the authority of the author, is sufficiently permanent or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration.”).

No two performances of any work are identical, and that kind of randomness is never permanently fixed in a traditional way. Only the expectation of it is embedded in the scores of the works. While the proportion of Cage's work devoted to randomness is significantly higher than other forms of music, its occurrence was intended by the author—hardly an unusual characteristic of composers' works and deserving of protection. The point is driven home by both a review in the *BBC Magazine* of the raucous reception Cage's 4'33" received at its premier and the composer's reaction:

At the post-concert discussion, shock and bemusement gave way to anger. Cage had seemingly thumbed his nose at the entire western concert tradition, even at music itself. Amid the uproar, an irate local artist shouted, 'Good people of Woodstock, let's drive these people out of town!'

Cage offered some intriguing insights when asked afterwards about the event: 'They missed the point. There's no such thing as silence. What they thought was silence, because they didn't know how to listen, was full of accidental sounds. You could hear the wind stirring outside during the first movement. During the second, raindrops began patterning the roof, and during the third the people themselves made all kinds of interesting sounds as they talked or walked out.'⁷⁹

⁷⁹ BBC Music Magazine, *What Is the Point of John Cage's 4'33"?*, CLASSICAL-MUSIC.COM (Sept. 28, 2021, 10:45 AM), <https://www.classical-music.com/features/works/what-is-the-point-of-john-cage-433/> [<https://perma.cc/RN4W-WN27>].

II. COMPUTER GENERATED ART

As noted in the Introduction, there is a variety of AI tools now being used to assist in the production of two-dimensional art works. The technical origins go back well into the twentieth century. Over time, systems have matured in a variety of other disciplines, including sculpture,⁸⁰ music, animation, language and conversation, video, dance, learning, and games.⁸¹ In many ways, the problems of intellectual property protection cut across these various disciplines. To focus on all of them, however, is not the purpose of this essay. Rather, the goal is to work through some of the issues associated with types of AI works based on traditional artistic disciplines. At the moment, the two AI technologies noted in the Introduction dominate this arena—Generative Adversarial Networks (GANs)

and Creative Artificial Networks (CANs).⁸² GANs are designed to emulate prior art history, while CANs are designed to move in new directions. Surprises abound as both networks work on various projects. And that is the cause of some consternation among those thinking about their position in the intellectual property world.

In general, art technology cannot produce anything without an established baseline and some guidance on what to do with it.⁸³ Even engines operating without the use of a prior art history database must start with something to work with.



⁸⁰ See Emma Bubola, 'We Don't Need Another Michelangelo': In Italy, It's Robots' Turn to Sculpt, N.Y. TIMES, <https://www.nytimes.com/2021/07/11/world/europe/carrara-italy-robot-sculptures.html> [<https://perma.cc/QBD6-XUJJ>] (Aug. 13, 2021). In the case of sculpture made from stone or marble, robots are doing much of the labor that used to be done by assistants in studios during the time of Michelangelo and other famous artists. The unwillingness of people to work with chisels and other tools for many months to create a large work has led to the use of other mechanical and robotic tools to do the hard labor. And just as the assistants did not get credit, neither do the robots. Much of the finish work—final sculpting, polishing, and the like—is still done by hand.

⁸¹ See *Timeline of AI Art*, AIARTISTS.ORG, <https://aiartists.org/ai-timeline-art> [<https://perma.cc/2TTH-PVP2>]; see also Jason Bailey, *The Tools of Generative Art, from Flash to Neural Networks*, ART AM. (Jan. 8, 2020, 12:23 PM), <https://www.artnews.com/art-in-america/features/generative-art-tools-flash-processing-neural-networks-1202674657/> [<https://perma.cc/3897-8XJ6>]; Fabian Offert, *The Past, Present, and Future of AI Art*, GRADIENT (June 18, 2019), <https://the-gradient.pub/the-past-present-and-future-of-ai-art/> [<https://perma.cc/VG38-VDLL>].

⁸² See Introduction, *infra*.

⁸³ *Id.*

The robot Ai-Da, for example, makes line drawings like the one displayed here by using her “eyes” to view a person, object, or scene. “She”⁸⁴ then makes a drawing using facial recognition software. “Her” work is then often “finished” into sculpture or paintings by others who prepare the items for gallery sale.⁸⁵ Even here, there is a deep collection of knowledge buried in the AI used by “her” technical innards to make a drawing. Facial recognition software must be trained by learning the characteristics of many thousands of images. Ai-Da uses that data to make drawings that look something like the real images propped up before “her.”⁸⁶

In fact, Ai-Da is a fairly “simple minded” AI project compared to many others now in use.⁸⁷ While its ability to copy an image in a primitive way is interesting, it lacks the ability to craft a more finished work using paint⁸⁸ or by casting a sculpture. Indeed, the name of the woman who turns the robotic drawings into paintings is not mentioned in the widespread publicity surrounding the project. Her name is Suzie Emery.⁸⁹ The robotic arm is not an artificial intelligence tool, but a cleverly engineered mechanical device that responds to the learning of facial recognition software. This interesting combination of AI and robotics has garnered a lot of public attention. But GANs and CANs are in many ways more expressively creative since they are involved in the production of much more highly polished final products. Ahmed Elgammal, the Director of the Art and Artificial Intelligence Laboratory at Rutgers University, has written an easy-to-follow description of how more complex AI projects like

⁸⁴ I have placed quotes around the feminine pronouns used when discussing Ai-Da to emphasize the creator’s desire to anthropomorphize the robot and make it seem more humanly creative than it really is by dressing it up in female clothing and placing a woman’s head around the robotic “mouth,” “vocal cords,” and “eyes.” Naomi Rea, *A Gallery Has Sold More Than \$1 Million in Art Made by an Android, but Collectors Are Buying into a Sexist Fantasy*, ARTNET NEWS (June 6, 2019), <https://news.artnet.com/opinion/artificial-intelligence-robot-artist-ai-da-1566580> [<https://perma.cc/2ENZ-4E26>].

⁸⁵ See Ahmed Elgammal, *The Robot Artists Aren’t Coming*, N.Y. TIMES (May 27, 2020), <https://www.nytimes.com/2020/05/27/opinion/artificial-intelligence-art.html> [<https://perma.cc/BL2L-4Y84>]. Ahmed views robots like Ai-Da as tools for artists; Rea sees Ai-Da, covered in an attractive white, female body and clothing, as playing on a fantasy that falsely presents Ai-Da as an attractive female artist. The photo of the displayed image is credited in the article by Rea to Victor Frankowski. Those who finish off the items initiated by Ai-Da are not given public credit for their contributions, even though they probably hold some copyrightable interest in the derivative works they create. See also Rea, *supra* note 84.

⁸⁶ See Rea, *supra* note 84.

⁸⁷ A recent summary of the field is Charlotte Kent, *Beyond the Janus-Faced Typologies of Art and Technology*, BROOKLYN RAIL (July-Aug. 2022), <https://brooklynrail.org/2022/07/art-technology/Beyond-the-Janus-Faced-Typologies-of-Art-and-Technology> [<https://perma.cc/NK34-UYPT>].

⁸⁸ Imogen West-Knights, *Why’s Ai-Da, the World’s First Robot Artist, Kind of Hot?*, ARTREVIEW (May 24, 2021), <https://artreview.com/why-ai-da-the-world-first-robot-artist-is-kind-of-hot/> [<https://perma.cc/YC6B-P9EU>]. West-Knights pans the project as a pretend “feminist” adventure taking advantage of men’s attitudes about gender by making “her” attractive, somewhat flirtatious, and coy. *Id.*

⁸⁹ *Id.*

GANs and CANs operate.⁹⁰ GANs are designed to craft images that imitate preexisting work; CANs produce works that present something new and different. In both settings, artists are deeply involved in selecting images to use in forming a database and in choosing those made by the AI tool to use as final products.⁹¹ In an intriguing reaction to the sorts of images produced by GANs, Elgammal wrote:

The generative algorithm can produce images that surprise even the artist presiding over the process. For example, a GAN being fed portraits could end up producing a series of deformed faces. What should we make of this?



....

The generated portraits from the GAN—with all of the deformed faces—are certainly novel, surprising, and eccentric. They also evoke British figurative painter Francis Bacon’s famous deformed portraits, such as “Three Studies for a Portrait of Henrietta Moraes.” But there’s something missing in the deformed, machine-made faces: intent.

Although it was Bacon’s intent to make his faces deformed, the deformed faces we see in the example of AI art aren’t necessarily the goal of the artist or the machine. What we are looking at are instances in which the machine has failed to properly imitate a human face, and has instead spat out some surprising deformities.

Yet this is exactly the sort of image that Christie’s auctioned [in selling *Belamy*].⁹²

The creation of surprises—whether unpredicted or random—is the central point of this essay. They are not truly failures, but rather examples of the qualities of the machine learning process that are well known by

⁹⁰ Ahmed Elgammal, *AI Is Blurring the Definition of Artist*, 107 AM. SCIENTIST 18 (2019), <https://www.americanscientist.org/article/ai-is-blurring-the-definition-of-artist> [<https://perma.cc/7GJC-FJ9C>].

⁹¹ *Id.*

⁹² *Id.*

those constructing neural networks. While a specific style of image (deformity) may not have been predicted by Elgammal and his co-workers the first time the tool was used, such a result was hardly surprising. When any AI system is first put into operation, it would be a miracle if unexpected results, let alone software bugs and outright mistakes, failed to appear. While the images may have formed without a *specific* intention by Ahmed and his co-workers to create deformed faces, those designing the GANs assuredly knew that random surprises were very likely to result when the complex AI tool was used.

After the initial run, of course, the users of the tool knew full well that facial deformations might happen unless that result was penalized in the algorithm's structure to make its occurrence less likely.⁹³ And that quality of surprise is what spurs a desire for many artists to get involved in training AI tools, tweaking them over time, and participating in selecting the works for public display. It is the uncertainty of the process, even after it has been run many times, that may produce the most expressive and interesting works. The notion that either random or unexpected results of an AI tool somehow removes the artist from the creative loop is untenable.

Artists using these tools typically are deeply involved in the AI learning process and in the selection of works produced with the AI tool's help that are deemed of value. They know that surprises will occur and often desire these results. Their intentions are like those of Rauschenberg or Cage—generating emotion and aesthetic interest without knowing specifically how it will manifest itself. It is no different from Calder's desire to let a mobile wander in space. As Elgammal correctly described it, “[I]t's not just about the final image. It's about the creative process—one that involves an artist and a machine collaborating to explore new visual forms in revolutionary ways.”⁹⁴

⁹³ In vastly over simplified terms, unwanted results of AI tools are assigned a lower “score” in the algorithm to discourage their creation. So, for example, a search engine may assign lower scores to racist statements in order to reduce the rate at which they appear high up in search results. *Id.*

⁹⁴ *Id.*

The production of art by CANs is more directly and intentionally surpris-



ing. That is the goal of such systems. They are programmed to produce works that are different from preexisting works, but not so bizarre that human minds reject it. AICAN, a CAN created by Elgammal at Rutgers, uses a database of 80,000 extant works, and asks the computer to produce “new” but not “too new” images. When the

images are viewed by people, they often are unable to discern whether the artworks are the products of people or the AI technology.⁹⁵ The AICAN picture shown here, entitled *St. George Killing the Dragon*, sold at auction for \$16,000 in 2017.⁹⁶

Like the outcomes produced by GANs, the images made with the help of CANs are quite close to the work of Calder, Rauschenberg, and Cage. In all cases, the artists make use of tools physically separate from themselves—the ambient air currents in a space, the movement of people in a gallery, the emotional impacts of silence, and the random outcomes of technology—to craft expressive works of human interest. Those who do raise objections to copyrighting works like *St. George Killing the Dragon* are likely to claim that once an AI system makes decisions independent⁹⁷ of active human activity, copyright protection should end.

⁹⁵ *Id.* That is one traditional indicator of AI “intelligence.” It is based on Alan Turing’s notion that a machine becomes intelligent when a human being is unable to determine if her or his discussion is happening with a computer or another person. See generally A.M. Turing, *Computing Machinery and Intelligence*, 59 MIND 433 (1950), <https://academic.oup.com/mind/article/LIX/236/433/986238> [<https://perma.cc/K98S-EWNF>]. But creating a tool that can do this does not pose the same question as the one posed here. Authorship is not conversational in the painting realm. The existence of AI tools that meet the test, however, does reflect the rapid development of AI systems.

⁹⁶ Elgammal, *supra* note 90. Other AICAN images are shown in this article.

⁹⁷ Use of vocabulary like this, of course, is heavily loaded with assumptions about the meaning of the term.

The best essay I have found suggesting limitations on the protectability of art made with the assistance of AI is the 2020 piece by Daniel J. Gervais entitled *The Machine as Author*.⁹⁸ While he makes several comments about the relationships between human creativity and AI, there is one especially important point where his logic breaks down, at least in the realm of art. Gervais opined:

[T]he binary paradigm according to which machines are either mere tools in the hands of human users or generators of either random output (therefore, non-original, as it does not result from creative choices) or entirely pre-programmed (as in . . . videogame audiovisual output . . .) is obsolete. Machines are capable of autonomous decision-making. The question to ask is, when do they reach the *threshold of autonomy* that separates or delinks their productions from the humans that programmed or used them?

Characteristics of autonomy include (1) the ability [to] make independent decisions or draw conclusions (2) derived from information gathered by the decision-maker. AI machines can process “big data” corpora of literary and artistic works, for example, and produce their “own” art.

Once the autonomy threshold has been crossed and a determination made that it is the *machine* that is making the relevant choices, two possible legal conclusions can be drawn. First, one might conclude that, because “all creativity is inherently algorithmic” and machines are, therefore creative, autonomous machine productions are protected by copyright. Logically it can be expected that industries that increasingly rely on machines to “assist” in the creative process will adamantly defend this view. The next step, if that path is chosen, is the search for the human proxy author, because the title in the work must vest in *someone*. This Article argues the opposite, namely that machines that make decisions and cross the autonomy threshold produce public domain material to which no copyright rights attach.⁹⁹

Gervais draws two important conclusions. First, he contends here (and elsewhere in his essay) that random output is not original because “it does not result from creative choices” And second, he argues that random outcomes produced by such non-creative decisions are inherently the options made by machines, not by human beings. Both are wrong. As demonstrated at length in this essay, traditional artists have crafted creative works with expression that they intentionally desire to be random or by crafting tools that are designed to produce random results. Randomness and unpredictability do not make the works any less creative, fixed,

⁹⁸ See Gervais, *supra* note 3.

⁹⁹ *Id.* at 2098–99 (internal footnotes omitted).

or expressive. It does not make them any less the result of creative choices made by people. In reality, the human-generated learning process that trains a CAN is intense, difficult, time-consuming, and highly curated. Training a CAN to produce work that is unexpected or random hardly turns the CAN into an automaton. It is instead an expression of variability much like that produced by a Calder mobile or a Trimpin sound installation. It is deeply the result of work undertaken by those who intentionally created a tool with randomness built in and curated the products later. The deep human involvement governs copyrightability,¹⁰⁰ and the U.S. Copyright Office continues to dismiss recent attempts to copyright works generated through AI.¹⁰¹

That conclusion follows in much the same way here as it does when other “tools” are selected by artists to make randomness manifest—whether they be paint dripping from above a canvas, air currents, movements of people, human voices, or facial expressions of emotions. Works produced by AICAN, therefore, such as the two displayed below, are not the results of decisions made independently by a machine.¹⁰² Artificial neural networks are intimately related to the creative choices made by those involved in training them, tweaking them over time, and selecting the works they help produce to show to the public.¹⁰³ As tools, they are

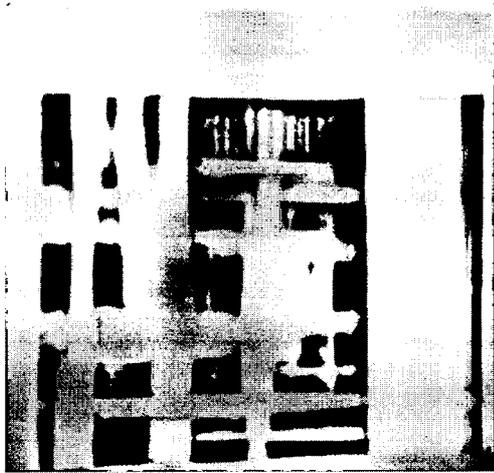
¹⁰⁰ Perhaps the AI system so far developed that is closest to the threshold of independence from human artistic instinct is DALL-E 2. See OPENAI, <https://openai.com/dall-e-2/>. Users typically enter (preferably) unusual requests for the system to produce an image. It responds with more or less success, however you might measure that. From the images produced, users may select one to use. The question of who is the author of the images is certainly difficult, but the extant terms of service for the system grant copyright in the images (with some exceptions) to those requesting the images. See *Terms of Service*, OPENAI, <https://openai.com/api/policies/terms/>. But even with DALL-E, the scope of human involvement in teaching the system how to operate is extensive. Though the system stores all the images it creates and uses them to teach itself how to operate, that system too is based on human intervention. While the size of the development staff may be quite large, that does not negate the role of human agency and therefore of the existence of copyrightable subject matter.

¹⁰¹ Shanti Escalante-De Mattei, *U.S. Copyright Office: AI Generated Works Are Not Eligible for Copyright*, ARTNEWS (Mar. 21, 2023, 11:48 AM), <https://www.artnews.com/art-news/news/ai-generator-art-text-us-copyright-policy-1234661683/> [<https://perma.cc/8ZRS-4M2C>]. For the Office’s rejection of the AI-generated comic *Zarya of the Dawn*, see Letter from U.S. Copyright Office, *Zarya of the Dawn* (Registration # VAu001480196), U.S. COPYRIGHT OFF. (Feb. 21, 2023), <https://www.copyright.gov/docs/zarya-of-the-dawn.pdf> [<https://perma.cc/48CY-NFWF>]. While the person putting in a simple request for an end-product as in DALL-E-2 may not be an author of the entire end-product, those who create a system that sometimes produces partially random results, in my view, may well be authors. What the U.S. Copyright Office seems to ignore is the possibility that creating a random system can still result in a copyright in the results the system produces. Think, for example, of a Calder mobile. See *infra* Part I.A. The systems the creator makes produce random results but that does not defeat the copyright in the system itself. See generally Richard Chused, *Quantum Copyright Law: Schrödinger’s Cat, Banksy’s Shredder, and Art on the Edge*, 20 NW. J. TECH. & INTELL. PROP. 265 (2023).

¹⁰² Photographs in Digital Spaces Gallery, in AICAN, <https://digitalspaces.io/demos/gallery/>.

¹⁰³ See SHANE, *supra* note 2, at 233. Shane has written an interesting, informative, easy-to-read book that makes much of the AI neural network world understandable to laypeople. She lays out in some detail the way AI machines are constructed, how they are taught, the kinds of judgments they

sophisticated. But they are not automatons. Call them human instruments of intentional unpredictability.



make, and the people responsible for the creations they produce. With art, she is very skeptical that AI neural networks are the true artists responsible for the compositions they are involved in producing. She writes, “Is all this art AI-generated? Absolutely. But is the AI the thing doing the creative work? Not by a long shot. People who claim that their AIs are the artists are exaggerating the capabilities of the AIs—and selling short their own artistic contributions and those of the people who designed the algorithms.” *Id.*

