Copyrighting Generative AI Co-Creations

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Abstract

While different countries vary in their determination of copyrightability, jurisdictions like the United States currently do not allow an artist to copyright AI-generated content when they do not have creative control. One avenue for an author to support their case for copyright protections over work created with AI may then be to demonstrate their intent to "predict" outputs of the generative AI tool during the creation process, shifting elements of randomness from the AI to the human's own decision-making as much as possible. When this happens, the artist might claim to have expressed their idea with generative AI, and seek copyright protection for their work. We propose that generative AI co-creation tools can support this intention by keeping records of the predictability statistics at each generative AI iteration, and capturing the potential alternate options that can be later assessed for how predictably they matched the prompt.

CCS Concepts

• **Social and professional topics** → **Governmental regulations**;
• **Human-centered computing** → **User interface toolkits**; •
Computing methodologies → *Reconstruction*.

Keywords

creativity support tools, generative AI, co-creations, copyright regulation, predictability

1 Introduction

As creativity software incorporating artificial intelligence (AI) becomes increasingly prevalent [22, 24, 28, 53, 59], and research continues to innovate ways for people to expand their artistic capabilities [32, 33, 38, 44, 54], artists and designers are producing more work with AI tools. However, the question of whether an artistic creation generated using software employing AI technology can be copyrighted does not have an obvious answer. While different jurisdictions vary in their determinations of works that are eligible for copyright protections, the U.S. Copyright Office (USCO), the largest copyright index in the world, has, thus far, rejected all attempts to

register copyright for work generated using AI tools[1] [12, 55, 56]. At the heart of the office's decisions is the determination that the human applicants for copyright registration lacked sufficient *control* over the creative process leading to the resulting work.[2] In these regulator and court opinions, control over the creative process has been cast in the language of *predictability*.

In this paper, we show how values important to the determination of the authorship under copyright law in the United States have defined predictability, and we consider how generative AI tools can be designed to operationalize a *predictability* interpretation of creative control to support human-AI co-creations. Predictability has been invoked as part of AI authorship cases in two main ways: (1) in the determinism of the prompt and configuration environment, and (2) in the amount of unexpected elements generated by the AI tool for the artist.[3] Based on how predictability has been invoked as part of authorship cases, we propose that AI creativity tools can support human authorship claims by (a) storing the history of iterations taken, (b) recording the randomness inherent in the generation process, and (c) documenting whether creative choices were indeed made by the human artist or came from the AI's generated content. Additionally, we suggest that generative AI tools that quantify the predictability of the generated outputs could allow copyright assessors to determine which parts of the work meets the threshold for creative control, as well as offer artists in the midst of making their piece the opportunity to proactively monitor and ensure that the creative aspects were determined by them rather than the AI.

To relate the predictability measures that we propose to copyright's protection of expression and to creative control, we draw from copyright law's judicially-created abstraction test devised in *Nichols v. Universal Pictures Corp.* [3]. Through the abstraction test, we show how the predictability measures we propose also aid in reasoning about the source of expression in the resulting human-AI co-creation. We introduce a conceptualization of user interactions with generative AI tools as lying somewhere on the spectrum of an "idea" (high abstraction level and high unpredictability) and an "expression" (low abstraction level and low unpredictability). Creative control then shifts towards the human artist where AI interactions

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[1]There are cases where an author has registered the copyright of the selection and arrangement of AI-generated output [27], but not the work itself, which is what we focus on in this paper.
[2]The importance of creative control has since also been enshrined in a USCO report [50]. In USCO's analysis, how generative AI is currently interfaced with does not give human users sufficient creative control to be eligible for authorship [50].
[3]As part of the decision in Wilson et al. [55], the role of the human in the resulting work was framed through predictability: it was the model rather than the human that "predict[ed] stylizations for paintings and textures never previously observed", in line with (1). As part of the seminal decision [27], it was determined that the creative process was not controlled by the human applicant because the applicant could not "predict" what the generative AI would produce ahead of time (in line with (2)).

occur at low abstraction levels—and where the unpredictability of the elements of the output is also low.

While there remains uncertainty about how copyright offices will assess the registration of works co-created with AI tools, we use factors important to determinations of authorship in the past to propose how generative AI creativity tools can be designed to support copyright registration in resulting co-creations. Not all works generated using AI creativity tools constitute co-creations or should necessarily be eligible for copyright protections. Rather, we consider how users of generative AI systems can demonstrate control over the creative process when co-creating with AI to gain copyright protections over the resulting work.

2 Background

2.1 Relevant Copyright Law

Before the advent of the printing press, the effort that an author spent handwriting their words was intertwined with the efforts of their written contributions: "A pirate who copied an author's manuscript by hand had to invest the same physical labor as the author or scribe who penned the original; the cost advantage of the pirated copy was virtually nil" [21]. With the printing press, the skill of the physical act of reproduction became decoupled from creative expression. With the cost of physical reproduction drastically reduced, the printing press raised the value of the writer's creative contributions. The technology changed the calculus of effort in creation and highlighted the necessity of protecting an author's intellectual contributions. As Burk [15] writes: "In a world where books are copied by hand in a scriptorium, there is no real need for copyright law; only once reproduction becomes cheap does copyright become a necessity." Devised as a response, the 1709 Statute of Anne [57]—recognized as the world's first copyright statute—established authors as legal owners and provided a 21-year term of protection over their works.

The first copyright statute of 1790 in the United States is derived from the Statute of Anne [46]. The constitutional basis of providing intellectual property protections, which includes copyright protections, in the United States is to "promote the progress of science and the useful arts" [18]. By granting authors exclusive ownership over their work for "limited times" [18], copyright law intends to provide incentives for authors to create new works. These protections extend internationally, through agreements such as the TRIPS agreement and WIPO Copyright Treaty, which mandate what is included and excluded from copyright protection.

2.1.1 The Idea-Expression Dichotomy. At the same time, it is only with a foundation of existing works that new works can be produced. The idea-expression dichotomy of copyright law is borne from this recognition. Certain elements of creative works—the ideas contained within them—are unprotected so that they may serve as basis for future works. The idea-expression dichotomy is both enshrined in the copyright statute[4] and has delimited the scope of copyright protections in practice [30]. In particular, *Baker v. Selden* [1] clarified that the aspect of an author's work protected by copyright is the expression of an idea, not necessarily the idea that

is expressed. In its protection of expression, copyright law aims to reward authors for honing their expression—such as in attending to each flicker of their paintbrush or to the linguistic ornamentations surrounding each turn of phrase [21].

The Abstraction Test. Judge Learned Hand devised the abstraction test in the case *Nichols v. Universal Pictures Corp.* [3]. The plaintiff, author of the play "Abie's Irish Rose", alleged that the defendant, producer of the film "The Cohens and the Kellys", infringed by taking from her work. Judge Hand used the conception of idea and expression operating along different levels to determine that the stock characters and the geographical settings that both the play and the film shared were too abstract, and thus concluded ideas were not protected by copyright law.[5]

The abstraction test as conceived of in *Nichols v. Universal Pictures Corp.* [3] and has since been applied in a series of cases, including in a 1992 case involving the copyright of computer code, *Computer Associates Intern., Inc. v. Altai, Inc.* [7]. As applied to code, the lowest level of abstraction involves the actual code and the highest level of abstraction involves the function of the code.[6]

2.1.2 Authorship. Authorship is requisite to copyright protections: the Copyright Act provides protections to "works of authorship" [45]. Technologies have shaped the evolution of authorship standards in the U.S. Indeed, "the United States has a history of expanding copyright protections as new technologies were developed, thereby allowing creative expression to develop along with them" [16]. Photography and the use of cameras is exemplary of this dynamic. The human authorship of photographs was initially met with pushback because photography was broadly perceived to be a mechanism by which facts—which are not protected by copyright law—were simply reflected [25].

The seminal case *Burrow-Giles Lithographic Co. v. Sarony* [2] expanded copyright protections to photographs where the photographer "makes decisions regarding creative elements such as composition, arrangement, and lighting" [49]. In *Burrow-Giles* [2], one of the justices describes being an author as "involv[ing] originating, making, producing, as the inventive or mastermind, the thing which is to be protected, whether it be a drawing, or a painting, or a photograph", and another justice describes the author in the context of photography as the one who "really represents, creates, or gives effect to the idea, fancy, or imagination".

Questions surrounding authorship in other contexts have since taken from standards of authorship presented in *Burrow-Giles* [2]. *Aalmuhammed v. Lee* [8], a case concerning co-ownership over a film, references *Burrow-Giles* [2] in limiting authorship of a movie

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[4]"In no case does copyright protection for an original work of authorship extend to any idea . . . regardless of the form in which it is described, explained, illustrated, or embodied in such work" [17, 102(b)]

[5]The test is as follows: "Upon any work, and especially upon a play, a great number of patterns of increasing generality will fit equally well, as more and more of the incident is left out. The last may perhaps be no more than the most general statement of what the play is about, and at times might consist only of its title; but there is a point in this series of abstractions where they are no longer protected, since otherwise the playwright could prevent the use of his 'ideas,' to which, apart from their expression, his property is never extended."

[6]"At the lowest level of abstraction, a computer program may be thought of in its entirety as a set of individual instructions organized into a hierarchy of modules. At a higher level of abstraction, the instructions in the lowest-level modules may be replaced conceptually by the functions of those modules. At progressively higher levels of abstraction, the functions of higher-level modules conceptually replace the implementations of those modules in terms of lower-level modules and instructions, until finally, one is left with nothing but the ultimate function of the program" [7].

to those with artistic control over the film, such as the director.[7] Crucial to our analysis involving generative AI are the factors that have been identified as critical to the author under copyright law when a machine is involved. From *Burrow-Giles* [2], being the "mastermind", or directing the creative process matter to findings of authorship. Ginsburg and Budiardjo [20] additionally identify factors like demonstrating "her [the author's] role determined the work's form and content." and "originality" in the work.[8]

2.1.3 Copyright Registration. Registration is not required for copyright protections because creative work is automatically considered copyrighted when fixed in some tangible form. However, registration confers additional substantial benefits. For instance, work must be registered "[before] an infringement suit may be filed in court" and a work's copyright registration enables "a record with the U.S. Customs and Border Protection (CBP) for protection against the importation of infringing copies" [47].

2.2 Considerations in Copyrightability of Generative AI Output

The development and deployment of generative AI manages to implicate almost every area of copyright law, from fair use [23] to secondary liability [58]. Two major questions about copyright have surfaced when considering generative AI tools for creating creative works. The first question concerns whether the AI models infringe on the copyright of the materials that it is trained on. While we do not focus on this question in this paper, we acknowledge that, without human labor and creativity, generative AI tools would simply cease to function. It is pertinent to consider the incentives for humans whose art comprise training data for these systems. This question is being addressed in many high-profile court cases [40] and has been explored within the scholarship [26].

We focus on a second question, which concerns how a human who interfaces with an AI (who we will refer to as the "artist") might gain copyright protection for creative work produced with the aid of generative AI systems, typically when their inputs comprise a series of prompts. Our goal in examining the second question is to provide recommendations for how designers of generative AI systems might incorporate features that support the registration of copyright protections in works produced using their systems.

2.2.1 AI Prompting and the Idea-Expression Dichotomy. Prompting, a primary way generative AI systems are interfaced with, has been defined as "the skill and practice of writing inputs ('prompts') for generative models" [36]. With a broad *idea* of, say, a "cat" encapsulated within a text prompt, generative AI can attach a particular *expression*—a specific visual image—accompanying that idea at the mere click of a keyboard and in seconds. While there is a broader question of establishing copyright and ownership of digital work, here we focus on the domain of visual images, i.e., the digital art

created through prompting AI. Prompting generative AI then challenges the underlying presumption in copyright law that expression, integral to the process of creation, is difficult. "[I]ntellectual property is justified as a legal tool to prompt investment in goods where creation is expensive but appropriation is cheap" [15]. By enabling expression with such ease, generative AI systems have been argued to automate the previously hard work of expression—which is what copyright law aims to encourage and protect [15, 30].

2.2.2 Registering Copyright. The USCO has also leveraged the shifting of the source of expression to the generative AI tool to reject copyright claims. One point that the office has made to deny copyright protections is that humans are providing the idea, but not the expression in the resulting work. A refusal of copyright for the Théâtre D'opéra Spatial piece explained that Allen "did not paint, sketch, color, or otherwise fix any of the deposit." [13]. This standard of expressing the art through physical effort has not typically been applied, and does not appear in other refusals published by the USCO [27, 55, 56].

The question of co-creation authorship does not depend on the level of creativity, which is typically minimal, i.e., only a "modicum of creativity" is needed [6]. In the landmark case, *Feist Publications, Inc. v. Rural Telephone Service Co.*, the U.S. Supreme Court explained, "the requisite level of creativity is extremely low; even a slight amount will suffice" [6]. This bare minimum is so low that it doesn't require creating something unique, as "a work may be original even though it closely resembles other works" [6, 20]. Two poets who independently create the same poem are both entitled to copyright." [29].

While copyright is often supported by bilateral agreements between countries, different countries can have differences in their policies and interpretations of the originality requirement. The United Kingdom allows copyright of wholly computer-generated work to be granted to the human who arranged it, but paradoxically, it is unclear whether such outputs meet the originality requirement; for the work to be copyrighted, it must be original, defined as having "human personality", resulting from "free and creative choices" and the "author's personal touch", which may be lacking in generative AI outputs. In China, an artist was able to gain copyright for an AI-generated image, and sue another party for infringement of the work in *Li vs. Liu* [11]. The decision is in contrast to that of the United States, but the reasoning provided by the court was still based on the human's contribution and vision, "the picture involved is generated directly due to the plaintiff's intellectual investment and it reflects the plaintiff's personalized expression" [11].

This brushes on the question of when is generative AI considered being used as a tool (like the camera in *Burrows-Giles* [2] or Photoshop software), rather than as an author? While there are proposals for new tests for distinguishing human versus AI contribution [34], we first look deeper towards explanations from the USCO.

3 Uncopyrightable Co-Creations Due to Lack of Human Control

A key determinant in the attribution of authorship is that a human author exerts control over the expressive elements of a work. At the time of this publication, four failed attempts to register copyright for generative AI have been reported (*Thaler*, *Allen*, *Sahni*, and

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[7]"In a movie this definition, in the absence of a contract to the contrary, would generally limit authorship to someone at the top of the screen credits, sometimes the producer, sometimes the director, possibly the star, or the screenwriter—someone who has artistic control. After all, in Burrow-Giles the lithographer made a substantial copyrightable creative contribution, and so did the person who posed, Oscar Wilde, but the Court held that the photographer was the author" [8].

[8]With originality, Ginsburg and Budiardjo [20] get at "independent creation plus a modicum of creativity".

Kashtanova). As noted, some copyright offices outside the United States have accepted copyright of generative AI work, but some of the determinations they make to determine originality follow similar considerations.

3.1 Co-Creations Considered as Autonomous or Act of Nature

Reaching as far back as *Burrow-Giles Lithographic Co. v. Sarony*, courts ruled in their case that taking a photo with a camera was a mechanical process, and did not comprise an idea (which cannot be protected by copyright), but more akin to a tool used by the artist expressing that idea [2]. Expressions of the idea are what can be protected, as they are the product of intellectual invention. From there, it was established that authors should be making the creative choices in their work to be able to copyright them.

In a different scenario, *Naruto v. Slater*, an organization represented a macaque (a type of monkey) to claim copyright infringement against a photographer who set up an environment where the macaque could take photographs of themselves in a reserve [9]. The courts held that the macaque, as a non-human, could not be granted copyright over the image. Slater, the photographer, later intended to sue Wikimedia Commons for posting these photos on their website, as Wikimedia's copies led to a decrease in Slater's income from licenses of the image. Wikimedia argued that because the photos were taken by a non-human, they were therefore public domain, but this was never tested in courts.

Acts of nature were not subject to copyright protection, even when humans have conceived of and maintained natural landscapes [10]. In *Kelley v. Chicago Park District*, the 7th circuit held that Kelley, the artist, did not meet the originality requirement. They attributed, "a garden owes most of its form and appearance to natural forces," referring to the autonomous nature of the plants. So Kelley was not credited for the wildflower growth that produced the display. This distinction will be important later in this section, as AI's production is based on instructions and data chosen by a human author.

More recently, *Thaler v. Perlmutter* arose from the U.S. Copyright Office denying registration of copyright for Thaler's use of a "Creativity Machine", a form of AI software, that produced an artwork titled, "A Recent Entrance to Paradise". The courts agreed with the copyright office's decision, agreeing that, "no valid copyright had ever existed in a work generated absent human involvement, leaving nothing at all to register and thus no question as to whom that registration belonged" [12]. The courts clarified that, "the image autonomously generated by plaintiff's computer system was never eligible for copyright, so none of the doctrines invoked by plaintiff conjure up a copyright over which ownership may be claimed." This statement casts the AI was operating autonomously, not under the control of the artist.

This concept of computer software being able to operate without human involvement, or interpreted more generously, without human contribution to the creativity, has continued to be a stance of the USCO up to today. US Copyright Office Compendium (Third) § 313.2 states, "the 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". With that phrasing, the USCO deems the work of configuring, running, managing, or validating the AI output as not being an intervention.

3.2 Artist as Mastermind Iterating Towards a Vision

How would an artist be considered more like a "mastermind" as in the prior examples about film directors who are able to have artistic control, or a photographer using a camera like a tool? Based on the standard that the artist must have this type of creative control, rather than submitting an idea to an autonomous tool, co-creations with AI seem different than the cases just described where the monkey, wildflowers, or Thaler's Creativity Machine had that control.

With much of creative work being iterative [42], the process is a form of control over the final outcome. What would typically be considered left to chance is instead corrected in the next iteration. Other works of visual art, such as photographs or movies, may have unexpected elements, such as a bit of improvisation or effects from weather. Yet there is no question of copyright for those mediums, because the author is able to review and redo the shot if what happened prevented their creative vision.

Returning to the recent case, *Allen v. Perlmutter* [13] at the US District Court in the District of Colorado, the USCO took the position that Allen did not contribute sufficient creativity to copyright the work despite the iterations. They explained, "Mr. Allen, who experimented with over 600 prompts before he 'select[ed] and crop[ped] out one 'acceptable' panel out of four potential images [..] (after hundreds were previously generated),' " (establishing that the "key" to copyright protection is "[h]uman involvement in, and ultimate creative control over, the work at issue" [56]. In fact, the need for many iterations was considered evidence against creative control, "It is the Office's understanding that, because Midjourney does not treat text prompts as direct instructions, users may need to attempt hundreds of iterations before landing upon an image they find satisfactory" [56]. Therefore, the USCO concluded that "an author must imbue the work with a visible form that results from creative choices" and as such, Allen's efforts did not meet this test. Therefore, the iterations require some form of proof of a creative contribution or vision from the beginning, and not seem like the artist unexpectedly discovered a satisfactory element to use in the piece.

Even when the original input was a photograph undeniably created by the author, using an AI tool to make the next iteration does not credit the changes to the human. The USCO was also unsatisfied with the application of Sahni, who attempted to register a photograph that he took but applied the manipulations by RAGHAV, an AI painting app, to adopt the style of Vincent van Gogh's The Starry Night painting. The copyright office explained, "RAGHAV's interpretation of Mr. Sahni's photograph in the style of another painting is a function of how the model works and the images on which it was trained on—not specific contributions or instructions received from Mr. Sahni." They felt that Sahni's contribution was insufficiently creative, "he provided three inputs to RAGHAV: a base image, a style image, and a "variable value determining the amount of style transfer" [55], which were at an overly high abstraction

level to be considered an expression, and thus the USCO concluded, "Mr. Sahni did not control where those elements would be placed, whether they would appear in the output, and what colors would be applied to them—RAGHAV did". In this exchange, Sahni did not possess evidence that they were iterating towards a specific creative outcome.

These cases suggest that predictability is a potential element to claiming copyright when the artist uses sophisticated tools, while going through many iterations of the work to achieve their creative vision.

4 Natural Predictability and Authorial Expression

Whether it is the human or the AI who had control of a contribution, and hence has the copyright, is often cast in language about predictability by the USCO. In this section, we examine recent decisions by that office to explain how regulators and courts have used the unpredictability of generative AI to argue that the users of the technology should not be granted authorship over the resulting outputs.

First, we consider the historical context surrounding how predictability has been examined in relation to authorship as part of court cases and legal scholarship. Crucially, unpredictability leading to a resulting work has not always disqualified an author's copyright. In the case *Alfred Bell & Co. v. Catalda Fine Arts* [4] involving the reproduction of paintings using mezzotint engravings, the judge noted that, "A copyist's bad eyesight or defective musculature, or a shock caused by a clap of thunder, may yield sufficiently distinguishable variations. Having hit upon such a variation unintentionally, the 'author' may adopt it as his and copyright it." Burk [14] additionally describes cases in which the unpredictability of certain factors may still be "premeditated" and employed as an "expressive tool". When an author intentionally leaves the windows open and the window knocks over a can of paint, the trajectory of the wind caused by the opening of the window can be likened to the trajectory of paint splattering caused by the flickering of the paintbrush: "Whether using a brush or a wind, [] intent to fix expression changes the calculus of authorship, shifting the outcome from accidental to expressive" [14].

Predictability has even been used to argue against originality and creativity—and ultimately that copyright protections should *not* be granted for a work. In the case *Feist Publications, Inc. v. Rural Telephone Service Co.* [6], the judge ruled that, despite the laborious production involved in the phonebook as part of the case, it was not a creation in the sense of copyright protections because it did not contain enough originality. The triviality of the alphabetical ordering of the phone book led to the determination that the book should not be granted copyright protections. "Feist itself seemed to take the position that predictability is antithetical to creativity: 'Rural's white pages are entirely typical . . . The end product is a garden-variety white pages directory, devoid of even the slightest trace of creativity.' " [43].

Where there is "intent" and a "foreseeable general outcome" that the author guides a resulting work toward, the author might be considered to exert creative control over the unexpected or unpredictable aspects of the work—i.e., "cede control over fixation

to an errant wind and remain an author" [14]. This foreseeability and control over these unexpected elements might differentiate predictability in the spirit of creativity from mere triviality. To use examples from Burk [14], where a splatter of paint is the result of wind from an unintended open window knocking down paint cans or from a seizure, this intent can be argued to no longer be there. On the other hand, where an author guides the process of creating a work through patches of unpredictability, that unpredictability need not disqualify the author from gaining copyright protections over their work.

Predictability has also been discussed in scholarship surrounding the attribution of authorship where machines are used. For instance, Ginsburg and Budiardjo [20] note that "the author's intellectual conception of the work need not reflect a complete or even an accurate prediction of the resulting work's contents". Ginsburg and Budiardjo [20] also argue that, in some instances, because the outputs of a machine can be predicted at the point of the machine's incipiency, the creators of the machine might rightfully be conferred copyright protections for their machines' outputs.

4.1 Predictability as AI Determinism, Predictability as Author Expectation

The USCO and other legal scholars have emphasized the broad concept of predictiveness, sometimes referred to as *randomness*, when discussing creative control. However, they have not distinguished the concepts of determinism, where the AI model produces a different outcome each time, and unexpectedness, where the artist who wrote a prompt underspecified that prompt and therefore gets an image they cannot foresee. One does not imply the other, as the AI feature can be deterministic but produce something unexpected, or an AI feature can have significant randomness to its process, but all fall within the range of what the author expected.

AI Determinism. Several examples from the USCO's decisions focus on the lack of determinism in the AI, "the 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" [48]. The public guidance they provide rejects human authorship when the computer is autonomous or operates randomly, which means indeterministic here.

In a recent decision by the US Copyright Office, Kristina Kashtanova had her copyright registration revoked for a graphic novel "Zarya of the Dawn" that she admittedly created with Midjourney, an image generation tool. While the copyright office did not refuse her copyright of the storyline or the arrangement, they rescinded the copyright protection from the images themselves, explaining, "the images in the Work that were generated by the Midjourney technology are not the product of human authorship" [27]. They continued to explain, "because Midjourney starts with randomly generated noise that evolves into a final image, there is no guarantee that a particular prompt will generate any particular visual output." This *guarantee* desired by the USCO is akin to a lower level of abstraction, removing elements of randomness from the process that prevents a more deterministic outcome. They added, "the process is not controlled by the user because it is not possible to

predict what Midjourney will create ahead of time," suggesting that the artist would need some sort of ability to anticipate the result.

Author Expectation. In additional explanations by the USCO, they have emphasized the artist's ability to expect the outcome, so that it is not the AI's work that makes an unpredictable creative aspect to the image. The USCO found that "Rather than a tool that Ms. Kashtanova controlled and guided to reach her desired image, Midjourney generates images in an unpredictable way. Accordingly, Midjourney users are not the 'authors' for copyright purposes of the images the technology generates" [27]. Here, unpredictability is in contrast to being controlled to reach a desired outcome.

Likewise, the USCO asserted for Sahni's use of RAGHAV, "it is the AI model, not its user, that 'predict[s] stylizations for paintings and textures never previously observed,' and that predictive function is tied to 'the proximity of the [style image] to styles trained on by the model.' " [55]. The meaning of "predict" here is akin to "choose", suggesting that the training data in the model was the source of the decision for what style to use, and not the artist Sahni, who did not know to expect a particular style.

The two definitions of predictability, as AI determinism and as author control, provide a framework to understand the concept of creative control, especially from the perspective of the USCO but potentially more broadly. As the AI generation is less deterministic, it seems to act more autonomously and potentially be contributing creativity to the work. At the same time, if the artist is seeing unexpected outputs, then they have not yet formed a creative vision for their use of the AI as a tool, and therefore are not credited for the accidental creative elements in the work.

5 Operationalizing Predictability as a Measure of Creative Control

In its AI policy guidance, the USCO makes a broad statement, "based on the Office's understanding of the generative AI technologies currently available, users do not exercise ultimate creative control over how such systems interpret prompts and generate material." But when examining the circumstances of each copyright rejection, it often comes down to predictability. We propose a theory for designing with AI, suggesting how artists might approach the concept of predictability when working with generative AI tools in a regulatory environment.

5.1 Identifying Expression: Prompting Up and Down Abstraction Levels

To reason about the relationship between predictability and the source of expression, we return to the abstraction test to conceptualize the process of expression in human-AI interactions as operating along different abstraction levels. We show how a human prompt input to a generative AI system might land somewhere between an idea and an expression. In response, the role of a generative AI tool might range from being the source of the output's expression to fulfilling the human's expressive vision based on her text prompt.

A precise prompt providing the exact instructions with no ambiguity, submitted to an AI model that is tuned to be deterministic, may consistently produce the exact image sought. In that way, it would be like software code being considered as the lowest level of

abstraction in *Computer Associates Intern., Inc. v. Altai, Inc.* [7] and *Nichols v. Universal Pictures Corp.* [3].

An example of a prompt operating at a low abstraction level might be one that specifies, in a single prompt or through iterations, the exact placement of clouds in a sky and or particular features of the objects in the image. At this abstraction level, there is arguably a set of expectations surrounding the kind of outputs the AI might generate. The output space of the system is increasingly constrained as the abstraction level is lowered, creating a higher degree of predictability surrounding certain aspects of the prompt. However, other elements of the resulting output that are not specified by the prompt might be considered more unpredictable.

At a high abstraction level, the prompter provides a text prompt closer to an idea or a vague instruction. At the highest abstraction level, a text-to-image AI generation tool might simply be asked to produce a picture—in which case the generative AI system and its training dataset become the sole source of the output's expressive elements. The founder of Midjourney, a generative AI interface that produces visual images, describes that the tool "go[es] to its favorites" when the instruction (prompt) is "really vague" [51]. This hearkens back to Ginsburg and Budiardjo's [20] conception of the "possibility anticipation test" where a designer should have sole authorship of arrangements made using what they designed (in Ginsburg and Budiardjo's case study, this would be a video game), if they were able to anticipate the results that their users arrive at. The users may themselves have a different opinion of their control over the AI, depending on the level of interaction with it [19].

5.2 Shifting Unpredictability from the AI to the Artist

The question for artists is not whether unpredictability is a good measure of creativity when deciding copyrightability. Instead, the question is whether unpredictability is what determines whether the human had creative control, or if the AI had creative control. Regulators like the USCO require any part of the submission where AI had control to be excluded from the copyright granted to the human author, so it is not copyrightable due to lack of authorship, not due to creativity. For a human to acquire copyright over the entire work, they may have to show that there were no unpredictable creative elements in the work. This predictability can be distinguished into two forms.

We refer back to one definition of predictability, the determinism of the AI feature. The determinism of the generative AI tool can be tuned by setting the same random seed each time, and tuning the model to return more likely outputs, namely by lowering a "temperature" parameter (a similar parameter may be "chaos") that affects the diversity of the generations. Some generative AI models may even allow this to be completely deterministic, producing the exact same output given the same input. The GPT documentation defines, "temperature is a parameter that controls the 'creativity' or randomness of the text generated by GPT-3. A higher temperature (e.g., 0.7) results in more diverse and creative output, [..] A temperature of 0 would make the model completely deterministic, always choosing the most likely token." In a scenario where the software is deterministic, it is simply programmatically-generated artwork, which *Stern Electronics, Inc. v. Kaufman* [5] explains, "The

visual and aural features of the audiovisual display are plainly original variations sufficient to render the display copyrightable even though the underlying written program has an independent existence and is itself eligible for copyright." This temperature setting would address the concern raised by the USCO as mentioned in Wang [52], "if the AIGC [AI generated content] is unpredictable and completely controlled by the prompter, it is not reasonable to argue that the AIGC has been fixed when the prompts are written and fixed."[9]

Next we refer to the second definition of predictability, the lack of unexpected creative elements in generative AI outputs. When the key creative elements are predictable, it may be thought of as being within the human's purview as a foreseeable outcome, and thus within their control in some way. However, whether the human can anticipate the outcomes is not necessarily the same as conceiving the idea [20]. But it can be evidence that they had conceived an idea already, as a form of creative vision. Nevertheless, a practice of anticipating the outcomes by being specific in writing the prompts to achieve a low abstraction level may be one approach to claim this form of predictability.

An **artist's strategy** could consist of transferring the unpredictability aspects of the process from the AI to themselves. For example, a prompt asking an AI model to "draw a cat" that produces an unexpectedly dynamic cat in an interesting pose may be deemed creative, and so it may be argued that the AI tool had creative control in selecting this drawing. However, a configuration where the AI model outputs the most generic resting cat, especially one that existing commonly online, merely by roughly averaging those images of that cat, could be argued as being predictable. Therefore, decreasing temperature in the generative AI configuration may support the claim that the artist had creative control. Even if a low temperature leads to some variation in the output, like in *Alfred Bell & Co. v. Catalda Fine Arts* [4] where the mezzotint reproductions of paintings may have possessed some inadvertent yet distinguishable variation, the court deemed the engraver to have met the standard of originality, and could copyright the mezzotint.

Referring back to *Feist*, the alphabetically-ordered phone book was determined to not comprise any creativity, and thus could not be copyrighted. Such an ordering is highly predictable, and there is nothing unexpected from seeing this in a phone book. Similarly, drawing a circle as a thin black perfectly-geometric stroke on white background is a common representation of a circle, and may be hard to gain copyright protection for it. However, a circle drawn with rainbow colors and varying stroke widths and twists that the artist decided while drawing it would have a stronger claim that it meets a threshold of creativity.

6 Implications for Designing Generative AI Co-Creation Tools

These regulatory considerations should be fundamentally part of creativity and design tools that incorporate generative AI features. Once a creative work is finished, it's often too late to think about

the questions of provenance retroactively. Even beyond the copyright protection status, artists can benefit from having documented evidence of the source of creative ideas.

6.1 History of Iterations and Prompts

A first step is documenting the contributions by capturing the history of generative AI iterations, choices, and the associated prompts written by the artist. As previously described, it may be difficult to draw the line between idea and expression, but having specific itemization of the exact prompts that led to particular edits or creations would help determine which level of abstraction the prompt may fall under.

Tracing the history of iterations can show whether there was a creative vision from the beginning. A detailed prompt at the start may indicate that the artist had a picture in their mind even before using any AI feature, lending credibility to a claim that AI was used as a tool under the human's control, rather than making the creative decisions. If prompts were abstract, but are clearly steered towards a specific goal, it would be useful to identify whether the updated prompts came from unexpected ideas in the AI generations, or whether they were iterations as the artist made creative decisions. Any artist-contributed sketches or plans can be part of this history, providing evidence of what was done before each step of AI generation in an iterative process.

If some work is accepted to be a true co-creation between human artist and the AI, so that copyright of a final image is not being sought, it can still be helpful to **determine which parts of the image were under creative control** by the artist. Those elements can be considered derivative work and still gain copyright protection for that specific contribution, such as in a remix [35, 41].

The creative process can also lead to **going back to a previous idea**, and a notion of branching or forking off an earlier version can be documented. If the artist had sketched a rough version of the final result at the beginning, and used that as input into the AI generation, that would be evidence of expression and creative vision, and should be documented.

There may be a benefit to **cryptographically proving the order** in which particular steps occurred. The chronological order in which the prompts, AI generations, and artist edits that occurred may be secured through a blockchain record [39], an idea also echoed by UX designers [31], including the belief that ownership should be traceable. Such assurance can be useful both in courts and for public verification of the artist's or AI's contributions.

6.2 Predictability Statistics

Alongside the history of prompts and updates to the images, predictability statistics could be computed for each AI generation. These can be informed by two types of information, based on the previous discussion about the two meanings of predictability.

One meaning is the configuration of the AI platform, specifically the intentionally-specified **determinism parameters**, often *temperature* or *chaos*. These parameters give instruction to the AI software about how much randomness should be in the result. It may be possible to have these parameters set to a minimum or zero, so that the most likely result is always generated. The visual analogy would be always selecting the most common next word

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[9]While this adjustment may be seen to decrease the creativity of the generated AI output, it has not empirically been found to be [37], despite OpenAI's statement; although even what is called "creativity" in copyright is not necessarily creativity [43].

that comes after a series of words, but instead it would be the most likely-to-satisfy image that matches the prompt. Additionally, even if the predictability parameter is set high to indicate that randomness is possible, whether the more likely or less likely outputs were chosen by the AI software could be documented. An artist may be able to claim creative control if randomness was a possibility, but in that particular scenario the AI model instead chose the most likely output. As noted, regulators and legal scholars have generally not distinguished this type of unpredictability inherent in the AI software from the ability for the artist to predict the AI output at each stage.

If the artist is using software that is instructed to choose the most likely output from its training model, and something similar to this output would be produced whenever the model is given the same prompt, this may satisfy a test of predictability. Therefore, a trail of statistics about these predictability parameters could quantify and give context for evaluating whether the AI outputs were predictable according to this definition of determinism. The predictability values could be judged along with the generated image, as well as in aggregate as a summary statistic to compute how much randomness was used in the entire image. Potentially, if computation performance is not a concern for the work, the variance of all possible outputs can be estimated for an even more granular quantification of predictability.

Beyond passive calculation of these statistics, creativity software could be proactive in providing a path for artists to take creative control by removing the unpredictability from the software, and making those decisions themselves. When the AI feature is about to offer something with a significant random aspect to it, a popup could ask the artist to take over and make choices, or neutralize the predictability parameter. A design pattern where there is an explicit confirmation requested for non-deterministic output could be desired in some situations.

A second measure of predictability could be the **prompt's specificity**. Even in a situation where the AI software is allowed to be unpredictable, a prompt may be written in a way such that the level of detail no longer resembles an abstract idea, but more of a specific instruction. This overall approach aligns with the aforementioned abstraction test used in legal reasoning, where ideas represented in AI prompts that are defined more precisely may become expressions. With more specific prompts, the artist could argue that they were able to anticipate the output of the generative AI feature, asserting a claim over the conception.

6.3 Practical Steps

This guidance may seem early relative to the timeline of the USCO, as that office has only recently published clearer guidance about the copyright status of generative AI output in 2025[10], echoing its views from earlier rejected copyright registration, but we think this is a reasonable approach for creativity tools and regulators to achieve a compromise. The approach of building histories and predictability statistics into creativity tools is compatible with multiple copyright jurisdictions, and beyond copyright, makes potential

claims of authorship more straightforward. However, this doctrine can only be tested through the development of these tools, along with future attempts to register copyright based on this guidance.

While being so explicit with predictability to shift the control towards the artist takes away the "magic" of AI when it becomes predictable, the use of AI becomes more like using any other tool. The effort required of the artist to fully instruct the AI towards their vision prevents an undesirable scenario where creativity is massively automated. The threshold for determining whether sufficient creativity exists for copyrightability is already set at a "modicum", which could be the same threshold for attributing creative control to the artist or AI: whether there was a modicum of creativity by either contributor. Therefore, creativity product developers and regulators could offer a safe harbor for using this approach, to reduce the current ambiguity on the question of copyrighting Human-AI co-creations.

7 Conclusion

Artists have always embraced technology to seek out new modes of expression and creativity and they will continue to use generative AI tools as creative aides. Cases being adjudicated by the USCO provide a glimpse of how the Registrar is trying to define human authorship and creative control when it comes to the use of generative AI, and it is clear that generative AI is blurring what used to be a better-understood distinction between idea and expression.

Our goal in this work is to identify key hurdles in "promot[ing] progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries" as promised in the U.S. Constitution. To that end, we argue that design choices by the designers of generative AI tools, and practices by artists, can help ease these hurdles via a careful accounting for the degree of predictability and control offered by these tools. Our recommendations are focused on tools for co-creation between builders and artists, and we expect that further dialogue between tool builders, artists, and the law, such as we present in this work, will help us move away from the false dichotomy of human-only or AI-only creation.

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