PEER-REVIEWED ARTICLE

DATA AND DISCONTENT: A CONVERGING HISTORY OF PHOTOGRAPHY AND AI ART

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ABSTRACT | Controversy and hype have long accompanied the arrival of new image-making technologies. Today, the rapid proliferation of artificial intelligence (AI) tools has ignited new debates over the role of technology in creative production and the extent to which machine outputs might constitute human creativity. Like photography in the nineteenth century, however, AI is emergent and experimental with a continuously developing relationship to the artworld. This article places AI in dialogue with the history of photography not only to contextualize its emergence within a longer trajectory of data-driven, image-making technologies, but also to demonstrate the theoretical frameworks that link them. By tracing historical development, function, and public reception, we argue that the convergence of AI and photography signals a shift in how photography itself is being understood, taught, and received. Ultimately, we demonstrate how photography's legacy provides a conceptual foundation for situating AI within the field of critical art history.

KEYWORDS | artificial intelligence (AI), AI art, photography, digital art, new media

Introduction

From today, painting is dead!
—Paul Delaroche (1839)

We're watching the death of artistry unfold right before our eyes.
—@OmniMorpho (2022)

Louis Daguerre (1787–1851) proudly announced the invention of photography to the French Académie des Sciences in January 1839, prompting French painter and academician Paul Delaroche (1797–1859) to lament the death of painting. Though Daguerre's advances were met with significant praise, and his daguerreotype would go on to achieve great success over the next twenty years, Delaroche was certainly not alone in his fears that photography would lead to some artistic decline. Nearly two centuries later, a Twitter user, later quoted in the *New York Times*, would post a similar sentiment about AI art, writing, "we're watching the death of artistry unfold right before our eyes."[1]

Heated debates have followed the emergence of new technologies in art for centuries. Developments from manufactured paint tubes and printing technologies to handheld video cameras and Photoshop have sparked discourses that are now fundamental to the field of critical art history. Generative AI tools, such as DALL-E, Midjourney, and Stable Diffusion, are the newest emerging technology that has the potential to revolutionize artmaking and are at the center of widespread debates that largely question the ethics of creating with new technology. Concerns over copyright have even inspired subversive technologies such as Glaze and Nightshade, tools that are meant to combat tech companies from training AI models on artists' work without permission. These tools allow them to "mask" their style or "poison" pixels to "manipulate machine-learning

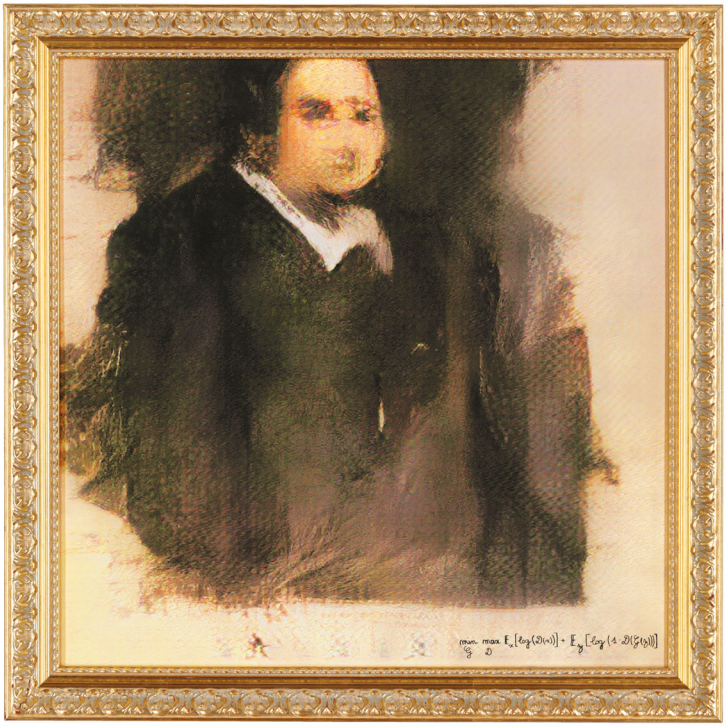

Figure 1: Obvious, Portrait of Edmond de Belamy*, 2018. © Obvious Art, Paris. GAN print on canvas (lot 363) sold at Christie's Prints & Multiples sale on October 25, 2018 for 432,500 USD (estimated at 7,000 to 10,000 USD).*

models to interpret the image as something different from what it actually shows."[2]

The purpose of this article, however, is not to address the ethical or legal implications that such AI image generators have on copyright. Courts, legislatures, and policymakers will continue to debate the establishment of guidelines and laws for data ethics, recognizing the very real impact these technologies have on commercial creative industries. Instead, we look at the development, growth, and reception of AI art in an art historical context that largely stems from critical theory. AI is an emergent and experimental technology—not unlike photography in the nineteenth century—with a continuously developing relationship to the artworld. Therefore, we place AI in conversation with photography to contextualize the emergence of AI within a longer history of art that intersects with data-driven image-making technologies. Beginning with the artist/scientists who integrated computer programming into their artistic practices, we then revisit the history of photography and the early innovators who straddled the line between technology and art. Retracing these parallel histories through the Gartner Hype Cycle, we not only demonstrate a shift in how photography itself is understood, but also how photography's legacy provides a conceptual foundation for situating AI within the field of critical art history.

Origins of AI Art

Artists have always pushed the limits of technological development. From automata to photography, film, and experimental new media, the history of art is deeply intertwined with the history of technology. This intersection became more distinct in the 1950s with the development of computers. Not only did computers offer a new frontier for calculation and communication, but they also introduced new tools, themes, and media for artistic exploration. "Computer art" quickly emerged as a category for works made with these machines, including those by Michael Noll (b. 1939), Frieder Nake (b. 1938), and Georg Nees (1926–2016)—artists/scientists who used plotters and punch-card technologies to create images that reveal the intersection of math, science, and art—made possible through the development of computers. As the technology slowly became more accessible and advanced over the following decades, artists were on the forefront of exploring the limits of this "new media" and began incorporating it into their practices.

One of the first artists/scientists to begin exploring computers as an artificial intelligence was Harold Cohen (1928–2016). Cohen became interested in algorithms and programming languages in the late 1960s, after a successful career as a painter trained at the Slade School of Fine Arts

and featured at the Venice Biennale, Documenta 3, and the Paris Biennale. In 1968, he relocated to the Visual Arts Department at the University of California San Diego. The artist taught himself to program and developed AARON in 1971, a rule-based system that Cohen hand-coded to direct a robotic machine to produce paintings.[3] Cohen began exhibiting his "computer-generated art" at conferences and other exhibitions to ask key questions: "What makes an image evocative? Can algorithms produce evocative images not rarely and accidentally but consistently? What are the minimum conditions under which a set of marks functions as an image?"[4] Like early photographers, Cohen's first images were hand-colored, a practice the artist often continued after AARON could mix color dyes in the 1990s. Over time, the program developed from plotter-based lines to a more complex system that incorporated color theory and autonomous, machine-painted compositions, even though AARON never utilized generative algorithmic programming. By the 2000s, Cohen was able to produce representational and abstract paintings via this ongoing collaboration between himself and AARON that continues to be a touchpoint for artists experimenting with AI technologies.

Cohen was also a pivotal figure in articulating an artist's relationship with AI, recognizing AARON as an intelligence that was different from his own. Though he maintained strict control over the program, Cohen saw AARON as his primary method for creating art that he could not produce alone. The work was featured in major galleries and museums, often credited as "drawing by AARON, coloring by Harold Cohen." According to his son Paul, an AI scientist himself, "AARON became not an artist in its own right but a poser of problems to an artist" that Cohen used "to think about color and composition and the conditions under which marks function as images."[5] In the artist's own words: "I can change the rules. AARON can't. It *IS* the rules. Which defines it as the most remarkable artist's assistant in history, not as an artist."[6] Like many artists interested in the development of emerging technologies, Cohen worked with AI in order to question, critique, and push the limits of both the technology itself and the definition of artistic practice. His relationship with the technology evolved—as with any medium—alongside the development of his career.

Cohen's work paralleled developments in AI at the time, which relied on hand-coded programs based on rules or statistical probability. As machine learning developed in the 1990s, others began to play with evolutionary and genetic algorithms that allowed data to "evolve" over time and be integrated into computer graphics.[7] By the mid-2000s, however, programmers were working to develop generative models that could create new information through neural networks that learn automatically. One major leap in this development was in 2014, when Ian Goodfellow and other programmers introduced Generative Adversarial Networks (GANs) as a new method for harnessing algorithms to analyze, mimic, and produce new images from datasets. GANs rely on pitting two neural networks against one another: one that generates synthetic data and another that discriminates between synthetic and real-world data.[8] This leap in technological development moved beyond hand-coded programs such as AARON and allowed the machine-learning process to produce new connections and conclusions based on input. Obvious's 2018 *Portrait of Ɛdmond de Belamy* (fig. 1) embraced this process. Three Paris-based artists—Hugo Caselles-Dupré (b. 1993), Pierre Fautrel (b. 1993), and Gauthier Vernier (b. 1993)—compiled a data set of 15,000 portraits painted between the fourteenth and twentieth centuries, then created their GAN to produce a new portraiture series. The resulting Belamy family tree investigates the ability of algorithms to interpret and contribute to the development of portraiture in art history.[9] Like Cohen, the artists were interested in what makes an image evocative, conducting a survey that asked: "How inspiring do you find this work?"[10] Their dialogue not only questioned the GAN's ability to understand the role of portraiture in the history of art but also its capacity to advance the subject for today's viewers.

Obvious sees their relationship to GANs in a similar way to Cohen's relationship with AARON. *Portrait of Ɛdmond de Belamy* is signed on the bottom right corner with the script: minG maxD Ex [log (D(x))] + Ez [log (1 – D(G(z)))], giving credit to the programmatic function that helped produce the image. To Obvious, the authorship is mixed. Caselles-Dupré says: "If the artist is the one that creates the image, then that would be the machine. If the artist is the one that holds the vision and wants to share the message, then that would be us."[11] The process is a continuous interaction between humans and the machine—the humans asking questions while the machine produces answers. Unlike Cohen's tightly controlled, hand-coded and rule-based system, however, this machine is given more range and data from which to draw conclusions using generative functions.

In the 2020s, text-to-image models became a widespread and accessible method for engaging with AI technologies that had been developing for decades. CLIP, or Contrastive Language–Image Pre-training, opened the door by encoding image-based and text-based information simultaneously.[12] Diffusion models also offered more stable neural network technology that could be scaled larger than earlier GANs.[13] These developments, along with the advancement of transformer models, allowed users to begin producing images and texts based on natural language processing (NLP), human language instead of computer code.[14] For example, producing an image like *Portrait of Ɛdmond de Belamy* could be done with a phrase such as "an incomplete portrait painting of a man wearing a dark coat and white collar with loose impasto brushstrokes that obscure the subject's facial features" rather than the function minG maxD Ex [log (D(x))] + Ez [log (1 – D(G(z)))]. The

Figure 2: Julia Albrecht, Have You Seen This Person? *(detail), 2023. AI-generated images (DALL-E 2, myheritage, inpainting/outpainting, Adobe Photoshop). Images courtesy of the artist.*

accessibility of these models (using programs such as DALL-E, Midjourney, and Stable Diffusion) has allowed those without specific training in computer science to produce images using AI technologies.

For artists, the shift to natural language prompts made an impact on both working processes and conceptual approaches to artmaking. Julia Albrecht (b. 1992), for example, represents the next generation of artists using AI technologies that were developed in the 2020s. She considers herself a "lens-based artist" with training as a photographer who extends her practice into emerging media to consider how the human experience evolves alongside the development of technology. Her 2023 series, *Have You Seen This Person?* (fig. 2) uses a combination of DALL-E 2, MyHeritage, and Adobe Photoshop to produce portraits that question the mediation of identity through today's digital technologies. Her photographic images attempt to capture the unique characteristics that we perceive as individuality, and therefore humanness, in an increasingly virtual world. The natural language capability of DALL-E 2 is critical to this conceptual project, as it allows Albrecht to use descriptive words in common language to create human likeness—a process that feels more connected to the human experience than a string of computer code, which was used in earlier GAN projects such Philip Wang's *thispersondoesnotexist*. This conceptual layer adds weight to the overall question: does any person you see online actually exist in real life?

Like the proliferation of accessible technologies such as digital cameras, Adobe Photoshop, and social media filters, text-to-image models using natural language prompts have revolutionized the capacity for artists with various training backgrounds to harness and use these tools as part of their practices. Though many new media artists still train their own models by writing algorithms for "small-language" datasets—"tiny grammars" that function as bespoke and intentionally collected datasets—natural language prompts have allowed this technology to explode into the mainstream.[15] Indeed, widespread access and immediate results are some of the most criticized aspects of this technology. In the 2023 reddit thread /ArtistLounge, user Absolutelynobody54 wrote: "What scares me the most about AI art is that it may make humans stop doing art . . . if people can instantly get a very accurate picture for free I fear they will just stop trying, stop learning."[16] The same critique can be found over and again in the history of photography, including an 1839 letter in a Dutch periodical that warned of "an invention . . . which could cause some alarm . . . A method has been found whereby sunlight itself is elevated to the rank of drawing master, and faithful depictions of nature are made the work of a few minutes."[17] This existential fear of technology replacing the human eye (and, by extension, creativity itself) with a mechanical one emerges along with the continuous changes and evolutions of technology, especially when technologies become broadly accessible to the general population. In the next section, we provide a brief overview of this common trajectory in relation to the history of photography, which experienced similar tensions in the artworld as the medium developed.

"You Press the Button, We Do the Rest"

Although the idea that photography constitutes an artistic medium is met with little resistance today, achieving this status was somewhat of an uphill battle. Early in photography's history, Henry Fox Talbot (1800–1877) advocated for the artistic qualities of the medium, especially of his calotype. In *The Pencil of Nature*, he not only referred to photography as "the new art of Photogenic Drawing," but also paired his photographs with text that drew direct connections between his image and paintings.[18] Accompanying his photograph titled *The Open Door* (fig. 3), for example, he writes:

We have sufficient authority in the Dutch school of art, for taking as subjects of representation scenes of daily and familiar occurrence. A painter's eye will often be arrested where ordinary people see nothing remarkable. A casual gleam of sunshine, or a shadow thrown across his path, a

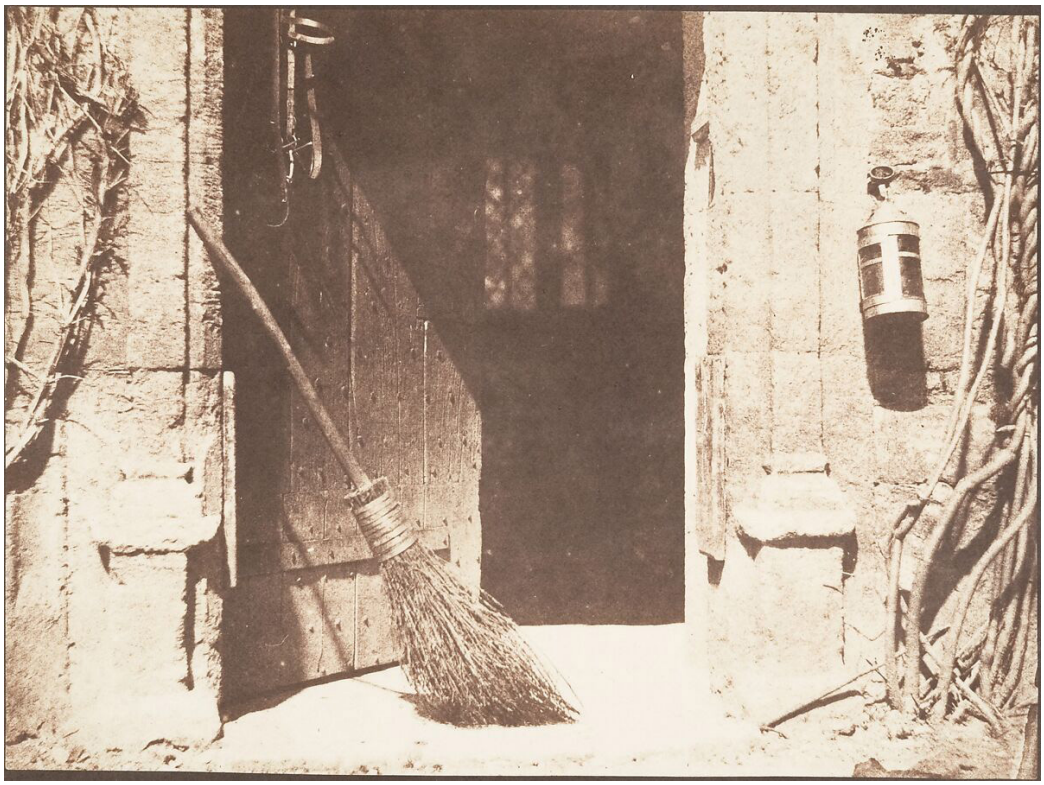

Figure 3: Henry Fox Talbot, The Open Door, *1844. Calotype. The Metropolitan Museum of Art, New York, Gilman Collection, Purchase, Joseph M. Cohen and Robert Rosenkranz Gifts, 2005.*

time-withered oak, or a moss-covered stone may awaken a train of thoughts and feelings, and picturesque imaginings.[19]

Despite such advocacy, few contemporaries were quick to agree, instead taking to popular platforms to condemn photography for its contentious relationship with so-called artistic talent. Charles Baudelaire, for example, lamented in 1859 that "as the photographic industry was the refuge of every would-be painter, every painter too ill-endowed or too lazy to complete his studies, this universal infatuation bore not only the mark of a blindness, an imbecility, but had also the air of a vengeance…If photography is allowed to supplement art in some of its functions," he continued, "it will soon have supplanted or corrupted it altogether, thanks to the stupidity of the multitude which is its natural ally. It is time, then, for it to return to its true duty, which is to be the servant of the sciences and arts—but the very humble servant, like printing or shorthand, which have neither created nor supplemented literature."[20]

The perception of photographic technologies as a scientific tool—be it for documenting historic architecture, unfamiliar territories, pseudoscientific features of criminals or the mentally ill, or social conditions[21]—prevailed until the early twentieth century. Due in part to the "precision" that technologies such as the daguerreotype and later glass-plate negatives offered to scientific and documentary pursuits, photography in general developed connotations of objectivity. In Emile Marcelin's 1856 bitter caricature *Down with Photography!!! Portraits of Yesterday and Today* (fig. 4), for example, the supposedly objective photographic portrait is positioned in stark contrast to the idealized painted version of the sitter.

By 1859, photography had already ceased to be a privileged medium, though the practice still required substantial knowledge and training. The introduction of George Eastman's Kodak camera in 1889, however, brought photography to the public. Advertised as the "only camera that anyone can use without instructions," the Kodak radically changed the course of photographic history by removing the burden of developing film from the photographer, who could now simply "press the button" and send off their roll of film to the Kodak factory to "do the rest." Moreover, at twenty-five US dollars in 1889, the Kodak camera was not cheap, but certainly more accessible than other options, which would have not only required the camera but also the equipment and space necessary for developing negatives.[22] But the Kodak camera was, of course, just the beginning, in many ways opening the doors for future developments such as the single-lens reflex (SLR) camera, the Polaroid, autofocus, and more—all the way up to the first camera phones of the Y2K era and eventually to the smart phones of today that

Figure 4: Émile Marcelin, Down with Photography!!! Portraits of Yesterday and Today, *1856. Source: Émile Marcelin, "A bas la photographie!!!,"* Journal Amusant, *6 September 1856.*

have quite literally placed the power of photography—and advanced photography at that—into the palm of our hands.

It was not until the 1890s—once photography had already become firmly rooted in the public sphere—that avant-garde groups such as the Brotherhood of the Linked Ring and their US counterparts, the Photo-Secessionists, began formally exhibiting photographs and promoting the status of photography as the "fine art" medium that we know today.[23] Even then, with interventions such as the Photographic Salon beginning in 1893, the opening of Alfred Steiglitz's 291 gallery in 1905, and a rising body of art criticism related specifically to photography through the lens of Pictorialism,[24] photography was not universally accepted as fine art. The Museum of Modern Art, for example, did not even begin collecting photographic works until 1930. Even so, fine art photography was almost exclusively considered to be black-and-white until the 1980s, when artists such as Martin Parr (b. 1952), William Eggleston (b. 1939), and others achieved recognition as art photographers working in color. Critical assumptions about what art photography was needed to shift in response to artists' approach to the technology.

Similarly, the introduction of Photoshop caused an apparent dilemma that threatened the future of photography. Though, as one *New York Times* article noted, Photoshop was "intended for professional artists," the high price point and technological demands made it largely inaccessible.[25] Artists wanted to use it but lacked the means to do so on a large scale. When Photoshop did become more technologically accessible and cost effective with the release of Photoshop for Windows 2.5 in 1993, the use of the software in artmaking would be called into question. Although photomanipulation is as old as photography itself,[26] digital tools would ultimately bring these techniques to a broader group of users. Mirroring developments such as the Kodak camera, as digital photomanipulation became prevalent among diverse users, the "art" produced using these tools became subject to controversy and criticism.

As Geoffrey Batchen summarized in a 1994 article for *Aperture*, "So photography is faced with two apparent crises, one technological (the introduction of computerized images) and one epistemological (having to do with broader changes in ethics, knowledge, and culture)." Though Batchen acknowledged the changing character of "photographic" images, he sought to make clear how the

use of computer-aided technology was no more than an extension of established photographic practices, albeit "less detectable" and easier to use than traditional techniques.[27] "Whereas photography claims a spurious objectivity," Batchen wrote, "digital imaging remains an overtly fictional process."[28] Beyond direct photomanipulation techniques, aesthetic decision-making (e.g., lighting, cropping, subject, composition, and perspective) has always been part of the photographic process. The difference now is not between objectivity and fiction, but rather how obvious the fiction is.

Still, the use of Photoshop continued to cause controversy in the artworld, even as recently as 2012, when British photographer David Byrne (b. 1969) was stripped of his award for Landscape Photographer of The Year for "excessive use of Photoshop."[29] Though Byrne's use of Photoshop would likely not be seen as excessive today—adding clouds, adjusting the light source—his peers' discontent with his technological intervention anticipated current debates around AI art and the extent to which artists may permissibly manipulate an image. A decade later, when Jason Allen submitted his work, *Théâtre D'Opéra Spatial* (fig. 5), to the digital art/digitally manipulated photography section of the Colorado State Fair, the use of AI tools sparked similarly intense backlash.[30]

Today, photography has reached a level of ubiquity such that anyone with even the most basic smartphone may call themselves a photographer. And yet, we still manage to consider photography a legitimate artistic medium, with all the affordances of other mediums associated with artistic practice: photography is held in prominent museums (often with dedicated departments and/or curators), shown in galleries, offered for sale regularly at blue-chip auction houses (again, often in dedicated departments), and featured frequently in art historical research. The fact that anyone can snap a photo does not preclude photography from being considered art—even in cases where the same or similar devices are used.

The Technology Hype

In the technology's progression from a highly skilled few to an accessible interface for popular use, AI's growth as an image-making tool closely mirrors that of photography's over the course of the nineteenth and twentieth centuries. While AI has achieved mass accessibility over a much shorter period than did photography—a few years rather than a few decades—both technologies have gone through comparable trajectories that align closely with the five phases of the Gartner Hype Cycle: 1) the technology trigger, 2) the peak of inflated expectations, 3) the trough of disillusionment, 4) the slope of enlightenment, and 5) the plateau of productivity. Within this model, which has frequently been applied to digital technologies including AI, technologists identify a pattern of peaks and valleys related to perceptions and use of new tools as they become increasingly part of the mainstream.[31] Although the model is imperfect and cannot be definitively applied to all technological developments,[32] it is a particularly useful framework in the context of AI's and photography's parallel histories as image-producing technologies that have achieved widespread accessibility. Notably, while the model is constructed in a linear fashion, many of these phases overlap and repeat as tools related to the technology develop and evolve.

Like AI image generators, photography did not just enter into the public sphere; first, there were triggers: key breakthroughs that sparked public recognition. In the history of photography, the trigger is undoubtedly Nicéphore Niépce's (1765–1833) "first photograph," *View from the Window at Le Gras* (1826–27). This is not to say that Niépce's breakthrough was the only one; indeed, his success was the culmination of centuries of experimentation with various successes and failures along the way. But this was a big one, and indeed one that has been written into history books as "the birth of photography." In the realm of AI, Deep Blue's defeat of world chess champion Gary Kasparov in 1997 is one such trigger, but so is Cohen's AARON, which, in the history of AI image making, can be seen as analogous to Niépce's heliograph.

From the trigger, we enter the peak of inflated expectations in which we see more experimentation among a greater number of relatively specialized practitioners as a result of the trigger's public recognition. Here, the failures greatly outnumber the successes and are impossible to list comprehensively. Within photography's history, Henry Fox Talbot and Louis Daguerre emerge as key figures in this phase with the calotype and daguerreotype, respectively. Neither is considered the "first" to produce a photograph (though Talbot himself would have disagreed), but they are notable innovators whose processes have become widely accepted as the first commercially successful photographic techniques. For AI, it was the early adopters of machine learning who were experimenting with algorithms as an artmaking technique, such as Karl Sims (b. 1962) in the 1990s who created animated forms, colors, and textures in videos. Other artists including Manfred Mohr (b. 1938) and Casey Reas (b. 1972) were similarly experimenting with evolutionary and genetic algorithms, circulating within the specialized field of new media artists at conferences and fairs such as SIGGRAPH and Ars Electronica.[33]

But importantly, there is a reason why these early processes are not regularly employed today. For photography, the peak of inflated expectations overlaps, to an extent, with the so-called trough of disillusionment, the phase in which the novelty wanes and interest only persists if the technology is sufficiently improved. While calotypes and daguerreotypes were successful, they certainly had their

Figure 5: Jason Allen, Théâtre D'Opéra Spatial, 2022. *AI-generated image (Midjourney, Gigapixel AI, Adobe Photoshop). Image in the public domain per the U. S. Copyright Office ruling of September 5, 2023.*

pitfalls—daguerreotypes were not reproducible, calotypes failed to produce sharp images—and other techniques, such as wet-plate collodion printing, emerged and fizzled out of favor as the gelatin silver print became the most commonly used photographic method (and remained so until relatively recent history). The parallel in AI image making manifests in works like Obvious's *Portrait of Edmond de Belamy*, which required a much more technical skillset and training to produce, but still marked a critical step toward the NLP processes that have now enabled the mainstream use of AI tools. None of these processes are obsolete—indeed, artists still use GANs, daguerreotypes, and other earlier processes as a technical core or even conceptual aspect of their practice—but newer, more user-friendly tools and techniques have emerged in the next phase.

The penultimate phase, the slope of enlightenment, marks the point at which the technology's benefits start to become more widely accepted, resulting in new versions; this immediately precedes mainstream adoption, or the plateau of productivity, the point at which we find ourselves today with both photography and AI. For photography, the slope of enlightenment was marked by key realizations such as the benefits photography might have for the press—resulting in innovations such as half-tone printing, which allowed photographs to be reproduced alongside text—or even the general public, ultimately leading to the Kodak camera, which transformed photography from a highly skilled practice to one that anyone could utilize. Once the general public gained access to photography, both through wide access to photographic images in the media and in their own ability to produce photographs with relative ease, the technology entered into the plateau of productivity. In this final phase we see not only widespread, mainstream use, but the continuation of developments to meet the demands of the market—color photography, digital cameras, phone cameras, and, arguably, the AI-generated "photograph."

For the development of AI, the release of Open AI's ChatGPT-3.5 and DALL-E 2 in 2022 exploded accessibility, making chatbots and AI image generators commonplace tools. These technologies continue to develop and are still working through necessary improvements to meet user demands, including more accurate renderings of text in images, more realistic human features (e.g., hands, teeth, eyes), and counteractions to the hyperrealistic, "photographic" outputs that have come to define AI images. At the same time, both the technology of photography and AI continue to evolve in tandem. But before discussing this moment of convergence in the histories of photography and AI, it is also important to consider the rise of both as artistic mediums.

Inputs & Outputs: Photography as Precursor to AI Art

There are several parallels to be drawn between the development of photography and AI from a sociocultural standpoint; however, the technologies themselves have much more in common than one might expect. At their core, both AI and photography are rooted in a system of inputs and outputs wherein the human feeds information into a machine in order to achieve a specific aesthetic result. Both are, in this sense, data-driven mediums wherein the machine acts as an intermediary between human creative input and a final product.

AI and photography both rely on a collaboration between the human and nonhuman. In machine learning, this is referred to as human-in-the-loop (HITL), or the human interaction with a model that trains and improves an AI over time. HITL can also apply to the iterative process of collaborating with a chatbot or image generator to achieve a deliberate, human-informed result. The same can be said of a photographer operating a digital camera. Daniel Rubinstein and Katrina Sluis argue that "[digital photography] has everything to do with the algorithmic processes that operate on the raw data collected by the light-sensitive sensors in a camera."[34] But even before digital photography, HITL processes point to photography as informed by inputs and outputs. Early photography, too, can be said to rely on HITL processes, from the choices one makes in setting up the photograph (e.g., lighting, angles, composition, subject) to the developing process and darkroom experiments. Indeed, as Joanna Zylinska has noted, much more can happen after the "snap."[35] Such collaborations are at the heart of artmaking, which is characterized by deliberate aesthetic decision-making, experimentation, happy accidents, or critical theory.

Data does not have to rely on ones and zeros; non-digitally encoded information can still be meaningful data. Albumen photographs, for example, result from the chemical process of light passing through a glass plate and encoding itself onto photosensitive paper. Like a digital file that encodes information in ones and zeros, revealing a photograph through pixels on a screen, the glass negative "writes" its information onto the sensitized albumen paper in a chemical code of light and silver. As Amanda Wasielewski writes: "*All* photographs do, in fact, have a code. This is the trick of photography: to disguise its transpositional process with the particularities of its form."[36] Photography, then, can itself be understood as a data-driven medium that has laid the groundwork for understanding AI in an art historical context.

In both AI and photography, probability and chance also play an integral role in the output. A photograph may reveal what the photographer intended to capture, but the inherent instability of the process—digital or analogue—also comes with the potential for the unexpected. Photographers stage a photograph with calculated inputs; AI artists craft original algorithms, language models, or prompts that reflect their own creative agency. The rest is, to some extent, up to chance and prone to revision, manipulation, or even regeneration until the desired output is achieved. Characteristic combinations of words, intentional phrasing, and personal experience all contribute to how an individual will prompt the machine; the output will inevitably differ from person to person. This is especially true in cases where there is a prolonged relationship with the tool—be it an AI model, a specific camera, or a chemical process. Well-practiced artists learn how to effectively communicate with the tool to create a distinctive body of work.

Given these commonalities, it is perhaps unsurprising that we are now experiencing a convergence of AI and photography such that the meaning of photography is beginning to evolve. This is not the first time that photography has experienced a semantic shift. From the literal meaning of *photograph* as a drawing made from light, the understanding of a "photograph" has expanded to connote a physical print of an image made using a camera, to a born-digital image, and now, to the AI-generated "photograph." Increasingly, it is the aesthetic quality of "photographicness" that is defining the medium of photography (even more than the technical process).[37] Wasielewski argues that our perception of photography is tied to specific aesthetic choices, to the point that "we are conditioned to see photographs as documents of things captured with a camera, even if they are not made that way." Zylinska extends this further, considering our current understanding of AI images to be "after-photography," or a medium "that has been shaped by photography, rather than any specific medium that has developed *from* photography…a mode of thinking and seeing for a future that will be photographic—but in a way that we may not always be able to recognize as such."[38] AI images do not result from any traditional photographic process, even if they are trained, in part, on what one would historically consider photographs (e.g., digital photographs or scans of analogue photographs). Still, some AI images have already been conflated with photography because *photograph* is the best word we have at our disposal for describing a certain aesthetic output.[39]

At the same time, we must continue deconstructing our perception of "photographs" as objective, truthful, or even real. As Eryk Salvaggio writes: "That's the trick of it. AI images aren't images at all. They are guesses at what images might someday become."[40] This relationship between human artists and non-human AI tools will continue to challenge perceptions of photography that have been deeply ingrained since the nineteenth century. Even Félix Nadar (1820–1910) recognized the "magic" and imagination of the darkroom in 1899, writing: "Everything that unhinges the mind was gathered together

there: hydroscopy, bewitchment, conjuration, apparitions."[41] Photography has always been rooted in a deliberate system of inputs and outputs that blur the lines between the "real" and the imaginary. Understanding this complex, data-driven relationship is key to contextualizing the history and trajectory of AI art.

Conclusion

As we look to the future of art using AI technologies, the history of photography is a critical reference point and throughline for contextualizing this development in contemporary art. Indeed, the practice of photography has dramatically changed in the two hundred years since its emergence and has been influenced by each new image-making and editing technology. Photography students today may have an opportunity to learn the daguerreotype or collodion process as it existed in the nineteenth century, but they are also enmeshed in the digital world brought about by the impact of Kodak, Polaroid, and Adobe Photoshop. Self-described photographers may or may not even use a camera—scanners, computers, and other photochemical processes (like the cyanotype) produce works that we understand as "photographs," whether or not a button was clicked on a machine to capture the image. Still, we understand this type of artmaking as photographic, considering the influence of various data inputs on the production of an image.

Artists will continue to assert their deeply thoughtful, critical, and technical engagement with the twenty-first century world through new media. Like Nam June Paik (1932–2006), who started working with the Sony Portapak video camera in 1965 to examine the rising impact of mass media, these artists often, in Paik's words, "use technology in order to hate it more properly."[42] Artists working with AI often do so in order to examine, critique, and otherwise poke holes in the technology itself to reveal its complications, ethical missteps, biases, and deep impact on modern society. They will continue to be entangled in their discontent with technology alongside us all, sharing in our complex and evolving relationship with photographic images that deeply affect the history of art.

NOTES

1 Kevin Roose, "An A.I.-Generated Picture Won an Art Prize. Artists Aren't Happy," *The New York Times*, September 2, 2022, https://www.nytimes.com/2022/09/02/technology/ai-artificial-intelligence-artists.html.

2 Melissa Heikkilä, "This new data poisoning tool lets artists fight back against generative AI," *MIT Technology Review*, October 23, 2023, https://www.technologyreview.com/2023/10/23/1082189/data-poisoning-artists-fight-generative-ai.

3 AARON doesn't stand for anything; it is thought that Cohen used "A" with the intention to start at the beginning of the alphabet and create other programs, but ended up spending the majority of his career on AARON.

4 Paul Cohen, "Harold Cohen and AARON," 63.

5 Paul Cohen, "Harold Cohen and AARON," 66.

6 Louise Sundararajan, "Harold Cohen and AARON: Collaborations in the Last Six Years (2010–2016) of a Creative Life," *Leonardo* 54, no. 4 (2021): 413.

7 Karl Sims, "Artificial Evolution for Computer Graphics," *ACM SIGGRAPH Computer Graphics* 25, no. 4 (July 1991): 319–28, https://doi.org/10.1145/127719.122752.

8 For more on the technical process of GANs, see: Ian J. Goodfellow et al., "Generative Adversarial Nets," *Advances in Neural Information Processing Systems 27* (2014): 2672–80.

9 Edmond de Belamy was named as a French pun on Ian Goodfellow's name, recognizing his contributions to the development of GANs.

10 Christie's, "Is Artificial Intelligence Set to Become Art's Next Medium?" December 11, 2018, https://www.christies.com/en/stories/a-collaboration-between-two-artists-one-human-one-a-machine-0cd01f4e232f4279a525a446d60d4cd1.

11 Christie's, "Artificial Intelligence."

12 For more on the technical process of CLIP, see Alec Radford et al., "Learning Transferable Visual Models from Natural Language Supervision," preprint, arXiv, 2021, *https://arxiv.org/abs/2103.00020*.

13 For more on the technical process of diffusion models, see Jonathan Ho, Ajay Jain, and Pieter Abbeel, "Denoising Diffusion Probabilistic Models," preprint, arXiv, 2020, *https://arxiv.org/abs/2006.11239*.

14 For more on the technical process of transformer models, see: Ashish Vaswani et al., "Attention Is All You Need," in *Advances in Neural Information Processing Systems 30—Proceedings of the 2017 Conference*, eds. I. Guyon et al., (Long Beach, CA: NeurIPS, 2017), 5999–6009. For more on natural language processing, see: Dan Jurafsky and James H. Martin, *Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition with Language Models*, 3rd ed. (Stanford, CA: Stanford University, 2025), https://web.stanford.edu/~jurafsky/slp3/.

15 We understand small-language models according to the definitions and use cases described by Mark Sample in his keynote address for the 8th Annual Digital Humanities Utah Symposium. Mark Sample, "Almost AI: The Pleasure and Poetics of Staying Human in an Age of Machines," (Keynote address, 8th Annual Digital Humanities Utah Symposium, Salt Lake City, UT, February 24, 2024).

16 Absolutelynobody54, "What scares me the most about AI art is that it may make humans stop doing art," Reddit, September 2023, https://www.reddit.com/r/ArtistLounge/comments/1701von/what_scares_me_the_most_about_ai_art_is_that_it.

17 Livia Gershon, "Did Photography Really Kill Portrait Painting?" *JSTOR Daily*, September 13, 2022, https://daily.jstor.org/did-photography-really-kill-portrait-painting.

18 Henry Fox Talbot, *The Pencil of Nature* (London: Longman, Brown, Green and Longmans, 1844), 1.

19 Talbot, *Pencil of Nature*, 25–26.

20 Charles Baudelaire, "The Salon of 1859," in *Art in Paris 1845–1862*, ed. and trans. Jonathan Mayne (London: Phaidon, 1965), 153–54.

21 See, for example, Charles Marville's *Album de vieux Paris (1865–1868)*; Maxime Du Camp, *Égypte, Nubie, Palestine et Syrie: Dessins photographiques recueillis pendant les années 1849, 1850 et 1851 accompagnés d'un texte explicatif* (Paris: Gide et J. Baudry, 1852); Alphonse Bertillon, *Identification anthropométrique. Instructions signalétiques* (Melun: Impr. administrative, 1893); Hugh Welch Diamond's portraits of patients at the Surrey County Asylum (1848–1858); and Jacob Riis, *How the Other Half Lives: Studies among the Tenements of New York* (New York: Charles Scribner's Sons, 1890).

22 25.00 USD in 1889 equates to roughly 838.00 USD as of the writing of this article. Conversion from 1889 US dollars to 2024 US dollars was made using the inflation calculator available at www.in2013dollars.com. This calculator uses data from the US Bureau of Labor Statistics's Consumer Price Index to convert historical values to present-day equivalents.

23 See, for example, Margaret F. Harker, *The Linked Ring: The Secession Movement in Photography in Britain, 1892–1910* (London: Heinemann, 1979); Robert M. Doty, *Photo Secession: Photography as a Fine Art* (Rochester, NY: George Eastman House, 1960); Robert M. Doty, *Photo-Secession: Stieglitz and the Fine-Art Movement in Photography* (New York: Dover, 1978); and William Innes Homer, *Alfred Stieglitz and the Photo-Secession* (Boston: Little, Brown and Company, 1983).

24 On Pictorialism, see Robert Hirsch, "Suggesting the Subject: The Evolution of Pictorialism," in *Seizing the Light: A Social History of Photography*, 3rd ed. (New York: Routledge, 2017), 191–215; Henry Peach Robinson, *Pictorial Effect in Photography: Being Hints on Composition and Chiaroscuro for Photographers* (London: Piper & Carter, 1869); Paul L. Anderson, *Pictorial Photography: Its Principles and Practice* (Philadelphia: J. B. Lippincott & Co., 1917); Patrick Daum, Francis Ribemont, and Phillip Prodger, eds., *Impressionist Camera: Pictorial Photography in Europe, 1888–1918* (London: Merrell Publishers, 2006); Alison Nordström, ed., *Truth Beauty: Pictorialism and the Photograph as Art, 1845–1945* (Vancouver: Douglas & McIntyre, 2008); and Rachel Sailor, *Pictorial Photography and the American West, 1900–1950*, Spatial Practices 39 (Leiden: Brill, 2023).

25 Peter H. Lewis, "The Executive Computer; New for Graphic Artists: Photoshop for Windows," *The New York Times*, July 4, 1993, https://timesmachine.nytimes.com/timesmachine/1993/07/04/675693.html.

26 Early on in photography's history we find examples of photomanipulation practices including hand coloring, double exposures, and overlays to create a variety of effects from artistic photomontage and collage to hoax images like spirit photographs. See, for example, Oscar G. Rejlander, "On Photographic Composition with a Description of Two Ways of Life," *The Photographic Journal* 4, no. 65 (April 21, 1858): 191–96; Elizabeth Siegel, *Playing With Pictures: The Art of Victorian Photocollage* (New Haven, CT: The Art Institute of Chicago and Yale University Press, 2009); Lindsay Smith, *Color and Victorian Photography* (London: Routledge, 2020); Paola Cortés-Rocca, "Ghost in the Machine: Photographs of Specters in the Nineteenth Century," *Mosaic: An Interdisciplinary Critical Journal* 38, no. 1 (March 2005): 151–68, https://www.jstor.org/stable/40346959; Jen Cadwallader, "Spirit Photography Victorian Culture of Mourning," *Modern Language Studies* 37, no. 2 (Winter, 2008): 8–31, https://www.jstor.org/stable/40346959; and Louis Kaplan, *The Strange Case of William Mumler, Spirit Photographer* (Albuquerque: University of New Mexico Press, 2008).

27 Geoffrey Batchen, "Phantasm: Digital Imaging and the Death of Photography," *Aperture* 136 (Summer 1994): 47.

28 Batchen, "Phantasm," 48. Emphasis in original.

29 Declan O'Neill, "Why Photoshop is Ruining Landscape Photography," accessed May 8, 2024, https://digital-photography-school.com/opinion-why-photoshop-is-ruining-landscape-photography.

30 Roose, "A.I.-Generated Picture Won an Art Prize."

31 "Gartner Hype Cycle," *Gartner*, accessed August 7, 2025, https://www.gartner.com/en/research/methodologies/gartner-hype-cycle. See also, e.g., Yoshiro Kondo, Kimitaka Asatani, and Ichiro Sakata, "Evaluating Emerging Technologies on the Gartner Hype Cycle by Network Analysis: A Display Technology Case Study," in *2022 Portland International Conference on Management of Engineering and Technology (PICMET)* (Piscataway, NJ: Institute of Electrical and Electronics Engineers, 2022), 1–11, https://doi.org/10.23919/PICMET53225.2022.9882631.

32 See, e.g., Ozgur Dedehayir and Martin Steinert, "The Hype Cycle Model: A Review and Future Directions," *Technological Forecasting and Social Change* 108 (2016): 28–41, https://doi.org/10.1016/j.techfore.2016.04.005; and Martin Steinert and Larry Leifer, "Scrutinizing Gartner's Hype Cycle Approach," in *PICMET 2010 Technology Management for Global Economic Growth* (Piscataway, NJ: Institute of Electrical and Electronics Engineers, 2010), 1–13.

33 For more on the artists working with evolutionary and genetic algorithms, see Joel Lehman, Jeff Clune, Dusan Misevic, et al., "The Surprising Creativity of Digital Evolution: A Collection of Anecdotes from the Evolutionary Computation and Artificial Life Research Communities," *Artificial Life* 26, no. 2 (2020): 274–306, https://doi.org/10.1162/artl_a_00319.

34 Daniel Rubinstein and Katrina Sluis, "The Digital Image in Photographic Culture: Algorithmic Photography and the Crisis of Representation," in *The Photographic Image in Digital Culture*, ed. Martin Lister (London: Routledge, 2013), 27.

35 Joanna Zylinska, *AI Art: Machine Visions and Warped Dreams* (London: Open Humanities Press, 2020), 109.

36 Amanda Wasielewski, "Unnatural Images: On AI-Generated Photographs," *Critical Inquiry* 51, no. 1 (2024): 13, https://doi.org/10.1086/731729.

37 Wasielewski, "Unnatural Images," 10.

38 Joanna Zylinska, *The Perception Machine: Our Photographic Future between the Eye and AI* (Cambridge, MA: The MIT Press, 2023), 61.

39 For more on the controversy of this conflation, see Liv Hausken, "Photorealism versus Photography. AI-Generated Depiction in the Age of Visual Disinformation," *Journal of Aesthetics and Culture* 16, no. 1 (2024): 2340787. https://doi.org/10.1080/20004214.2024.2340787.

40 Eryk Salvaggio, "The Hypothetical Image," *Cybernetic Forests*, November 20, 2023, https://www.cyberneticforests.com/news/social-diffusion-amp-the-seance-of-the-digital-archive.

41 Félix Nadar, *When I Was a Photographer*, trans. Eduardo Cadava and Liana Theodoratou (Cambridge, MA: The MIT Press, 2015), 3.

42 This is attributed many times to Nam June Paik, likely originating from his Manifesto written in 1965 and quoted extensively in the years since.

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