

# The infinite as paradigm: Reframing the limits of AI art

Magdalena Krysztoforska and Oliver Kenny

NECSUS 13 (2), Autumn 2024: 132–155

URL: <https://necsus-ejms.org/the-infinite-as-paradigm-reframing-the-limits-of-ai-art/>

## Abstract

This article explores the recent proliferation of GenAI models capable of generating ‘infinite’ sophisticated visual and audio outputs, and it discusses the challenges that these models pose to an AI art discourse oriented around concepts such as creativity or agency. We propose ‘the infinite’ as a new paradigm that shifts the focus away from individual artists and artworks, offering a more scaled-up perspective on cultural practices in the age of AI. We argue that rather than making the previous paradigm obsolete, the infinite acts as a vector of expansion of the discursive limits of AI art.

**Keywords:** generative artificial intelligence, machine learning models, paradigm shift, infinity, scale

‘What might it mean to be able to produce infinite worlds from a single painting or photograph?’<sup>1</sup> This question was posed by the artist duo Holly Herndon and Mat Dryhurst in relation to their experiments creating ‘infinite images’ using early versions of DALL-E, a generative AI (GenAI) model capable of producing high-quality images from textual prompts. Herndon and Dryhurst have long been at the forefront of using machine learning (ML) methods in creative practice, yet working with a powerful text-to-image model was a novel experience for them. They remarked that: ‘this significantly augments the capacity of what we understand of generative art, when a coherent world, or narrative, can be spawned from a single stylistic or linguistic prompt’.<sup>2</sup> This capacity for ‘spawning’ new and convincing aesthetic output from a single prompt has received a lot of attention in

recent years. In the broadest sense, generative models produce new outputs that follow patterns observed in training data, and this process has become significantly more intricate and refined over the last decade. Technical developments such as variational autoencoders (VAE),<sup>3</sup> generative adversarial networks (GAN),<sup>4</sup> transformers,<sup>5</sup> and diffusion models<sup>6</sup> paved the way for the latest era of GenAI, dominated by a group of models increasingly referred to as ‘foundation models’ (highlighting their adaptability to a variety of downstream applications), whose impressive performance, scale, and versatility have been characterised as a ‘paradigm shift’.<sup>7</sup> A subset of this group – popular text-to-image models such as Midjourney and Stable Diffusion – have particularly captured the public imagination with their capacity for producing potentially infinite high-quality images from a simple prompt.

In this article, we try to grapple with these new technologies and their resulting creative possibilities. The concept of infinity guides our thinking, as it has become a recurrent theme accompanying developments in these models and their uptake in creative domains. The fascination with the possibility of infinite art has previously led to experiments such as open-ended artworks (for example Mario Klingemann’s *Memories of Passersby I* [2018], an unending stream of AI-generated faces, one continually morphing into the next) or models imitating a well-known artistic canon (as in the case of numerous projects that can continuously produce new music in the style of Bach or other famous composers<sup>8</sup>). More recently, however, technical developments in GenAI have led to new uses of the ‘infinite’ capacities of these models, uses which go beyond traditional art formats and the classical art canon. Examples of such practices include continuous inpainting and outpainting (filling in or continuously expanding a given image),<sup>9</sup> as well as ‘infinite’ audio and video livestreams (such as Dadabots’ continuous Relentless Doppelganger death metal stream<sup>10</sup> and AInfiniteTV<sup>11</sup>). The concept of the infinite also frequently figures in the language of GenAI applications, with Stable Diffusion’s interface including a ‘generate forever’ option for continuous output, and OpenAI’s Sora model for generating videos boasting the capacity to ‘produce a seamless infinite loop’.<sup>12</sup> We see these developments as part of a broader shift in how AI technologies interface with cultural practices, requiring a reconsideration of some of the previous analytical framings of AI art.

Much of the existing debate around AI art, especially in the broadly-conceived area of media studies and related disciplines, is often preoccupied with adjudicating whether AI art can truly be considered as ‘art’, and with ascribing notions such as ‘creativity’ or ‘agency’ to humans and machines in varying degrees. The criteria for such assessments are typically constructed in terms of particular discursive limits (is it creative enough? original enough? intentional enough?) and operationalised in analyses of particular artworks and creative practices. While AI art is certainly not a new phenomenon, this article argues that the increasing capacity for generating infinite outputs from a single model complicates some of the operative concepts and limiting criteria in debates around AI art.

In order to explore the ramifications of these changes, we propose the infinite as a new paradigm, requiring different terms of engagement. We argue that the new practices and output formats enabled by GenAI shift the focus away from individual artworks and artists, and towards a more scaled-up view of culture. We frame it as a new paradigm, however unlike in Kuhn’s famous formulation (normal science – crisis – revolution – new tradition of normal science<sup>13</sup>), there is no competition between the two paradigms; the infinite simply offers a different perspective. While questions of agency and authorship will continue to be meaningful for distinguishing between high art and creative content in the artworld,<sup>14</sup> we suggest that adopting a more scaled-up view can motivate new questions that help us understand how these technologies interface with culture and our understanding of it.

## **GenAI and the discursive limits of AI art**

Recent decades have seen rapid advances in AI, enabled by the increased availability of data (a crucial resource for training models, increasingly abundant since the advent of Web 2.0), better hardware leading to more computing power, and technical breakthroughs in ML methods. Developments in generative deep learning have been particularly consequential for the cultural sector and creative domains, especially since 2014, when techniques such as VAEs and GANs were experimented with by technically-proficient artists to produce compelling high-quality outputs.<sup>15</sup> Subsequent

progress driven by the rise of transformer models (the technology at the heart of generative pre-trained transformers [GPT]<sup>16</sup>) and diffusion models,<sup>17</sup> rapidly established multimodal GenAI as the key development focus, with new models capable of processing multiple data formats (image, text, video, etc.) and accomplishing many different tasks that can be specified by the user, typically through natural-language inputs known as ‘prompts’. The substantial cultural impact of these technologies became instantly apparent when models such as DALL-E 2 (2022), Stable Diffusion (2022), Imagen (2022), and Midjourney (2022) were made available to the public and became hugely popular thanks to their ability to rapidly render unique, stylistically varied, and highly-compelling images from a single prompt. Furthermore, the popularity of GitHub, Google Colab, and Discord as platforms for exchanging ideas amongst GenAI enthusiasts, combined with the widespread practice of disseminating pre-print versions of new technical research, lowered the barriers to entry and allowed tech-savvy artists to explore the potential of AI tools without needing institutional support.<sup>18</sup>

The cultural consequences of these technologies have also been increasingly contemplated in media studies and in related disciplines within the humanities, often in discussions that involve questioning whether AI art<sup>19</sup> can be considered art and whether it is doing anything new.<sup>20</sup> While responses to these questions range from wholesale embrace to categorical refusal, the dominant terms of the debate remain remarkably consistent, oscillating around concepts such as creativity or agency, and discussed in relation to specific constitutive elements of the artworld, such as particular artists or artworks. The common limiting criteria operationalised in this context are based on the level of purported intentionality behind AI art, and on deciding whether machines are creative enough to be understood as artists. Many voices in this debate are sceptical, seeing machines as incapable of generating previously impossible ideas<sup>21</sup> (often framed in terms of ‘transformational creativity’, drawing on Boden’s taxonomy<sup>22</sup>), or as unable to go beyond statistical patterns of the input data.<sup>23</sup> While some scholars argue that there are no specific criteria for defining art that would a priori exclude machines,<sup>24</sup> or that the primacy of humans in artmaking needs to be reevaluated,<sup>25</sup> others lean towards a framing of art as a primarily human endeavour.<sup>26</sup> Those who do not exclude machines from the domain of art entirely still often make a clear distinction between the human artist and the machine as a tool in the creative process.<sup>27</sup> Nevertheless, a number of

commentators are willing to attribute at least some form of agency to AI systems, for example by viewing AI as a ‘creative partner’,<sup>28</sup> ‘collaborator’,<sup>29</sup> or ‘(co-)creator’.<sup>30</sup> Scholarship grounded in posthuman or new-materialist thinking often situates the artist within networks of non-human materialities, where no definitive boundaries between different creative agents can be drawn,<sup>31</sup> and Moruzzi goes as far as to argue that music-producing GANs have achieved ‘a level of autonomy which is sufficient to deem them able to create musical works’.<sup>32</sup>

It is also important to point out that concepts such as creativity or agency are discursive, and their centrality in discussions of AI art has been challenged. For example, Audry and Ippolito insist that “‘can machines be artists?’ is the wrong question”,<sup>33</sup> and Zylinska similarly suggests that asking whether machines can be creative is a ‘misguided question’.<sup>34</sup> Moreover, Manovich argues that the measures of creativity most commonly used to evaluate AI art are very narrow, closely related to notions of technical mastery of some artistic skill,<sup>35</sup> and Grba posits that ‘AI art expands the idea of technologically entangled creativity’<sup>36</sup> and requires a careful rethinking of the ramifications of the term. Nevertheless, despite the somewhat contentious nature of these terms and the lack of consensus around their application, their continued prominence points to their importance in debates around AI art.

Aside from discussions interested in situating notions of creativity or agency in relation to humans and machines, or artists and their tools, AI art is also frequently analysed in terms of the qualities of the creative output produced with AI. Such discussions are often centred on a number of now-canonical examples of AI art, such as: *The Next Rembrandt* (2016), an AI-generated 3D-printed painting in the style of Rembrandt; *Portrait of Edmond de Belamy* (2018), a GAN-based artwork trained on 15<sup>th</sup>-19<sup>th</sup>-century portraits found on WikiArt and sold by the auction house Christie’s; or *Théâtre d’Opéra Spatial* (2022), an AI-generated image that received a prize at the 2022 Colorado State Fair, subsequently triggering an online backlash. When evaluating the aesthetic and cultural value of AI artworks, some commentators argue that AI aesthetics are mostly derivative,<sup>37</sup> that AI methods are a ‘force for stylistic standardization’,<sup>38</sup> or that these technologies offer ‘little enough variation to tickle curiosity, but never enough to unsettle standards’.<sup>39</sup> Hassine and Neeman are similarly critical in their assessment of the

*The Next Rembrandt* and *Portrait of Edmond de Belamy*, characterising them as ‘Zombie Art’, meaning ‘paintings that attempt to simulate the style and content of masters that have been dead for centuries’,<sup>40</sup> while Wasielewski suggests that the interest garnered by these works is mostly due to the novelty of their machinic origins, rather than their artistic qualities.<sup>41</sup> At the same time, another strand within discussions of AI art focuses on the circumstances in which the artwork is encountered as the locus of creativity or originality. Danesi suggests that ‘the culturally-based context in which a work is assessed is critical in shaping the perception that it is art or not’,<sup>42</sup> and he attributes the success of *Théâtre d’Opéra Spatial* to the art-competition context in which it was originally judged. Similarly, some scholarship points to reception and context as key elements for understanding the value and impact of AI art,<sup>43</sup> with Cascales proposing that ‘art exists only when interpreted as such’,<sup>44</sup> and Ch’ng pointing to acceptance by the artworld as the necessary condition for AI art to attain the status of art.<sup>45</sup>

Our brief overview of some of the prominent features of discussions around AI art is by no means exhaustive, and there are certainly examples of scholarship that takes a broader view of the GenAI phenomenon. Large text-to-image models have been commented on as ‘allow[ing] us to look back at cultural history in new ways’,<sup>46</sup> as ‘giv[ing] rise to new aesthetics that may have a long-term effect on art and culture’,<sup>47</sup> and as elevating the importance of natural language in visual culture, given the central role that textual prompts play in interactions with these models.<sup>48</sup> The paradigm-shifting role of GenAI in image production has also been discussed in terms of a potentially ‘novel media form and an emerging research field’.<sup>49</sup> Nevertheless, such broader-view perspectives are still a relative minority within the discourse, and recurring discussions of concepts such as creativity and agency constitute a meaningful pattern. Moreover, despite increasing acknowledgement of the blurring of boundaries between creator and tool, conceiving of AI art in terms of traditional notions of the artwork or the artist, and in relation to paradigmatic works, remains commonplace. To be clear, we are not arguing that the dominant operative concepts are obsolete; on the contrary, we believe they help to analyse numerous artistic practices within AI art. Nevertheless, we suggest that these terms impose a certain limit, and inadvertently constrain the framing of changes precipitated by progress in GenAI and its creative uptake in the last few years. In particular, the way in which the notion of infinity seems to animate a wide range of

practices and technical research in GenAI gives rise to cultural phenomena that exceed the boundaries of discrete concepts such as artist, artwork, or artworld. The infinite paradigm enables a shift of scale and positions these new models as not solely a creative technology, but also an epistemological technology. In what follows, we will elaborate on how the changes precipitated by foundation models enact a subtle shift of perspective, which opens up new ways of conceiving of culture and aesthetic information at scale.

## The infinite and its scalar dynamics

The concept of infinity – the origins of which are generally attributed to the Greek philosopher Anaximander<sup>50</sup> – has sparked vigorous debates across numerous disciplines ever since its conception. Scholars writing about infinity frequently characterise it as an enigmatic concept, with Rotman describing infinity as ‘a notoriously troublesome idea, difficult to pin down, full of paradox’,<sup>51</sup> and Clegg stating that:

Infinity has this strange ability to be many things at once. It is both practical and mysterious.<sup>52</sup>

In the context of data-driven technologies, the idea of the infinite has previously been used to capture the experience of engaging with the deluge of online content. Echaury identifies it in the ‘infinite scroll’ of social media, in autoplay features on streaming sites, or the ‘infinite swipe’ on dating apps, arguing that ‘contemporary media remains distinctly defined by its propensity towards infinitude’.<sup>53</sup> Pajkovic similarly describes Netflix as creating the illusion of infinite content,<sup>54</sup> while Lupinacci frames the ‘infinite stream’ of social media as a mechanism by which continuous connectivity is ensured.<sup>55</sup> Moreover, Echaury suggests that the rise of GenAI opens up the possibility for ‘the media paradigm to assume an even broader and more effective sense of infinity’.<sup>56</sup> As we discuss below, the way in which the idea of infinity mobilises changes in AI art is similarly multifaceted, spanning technical breakthroughs, their consequences for creative practice, as well as epistemic insights, all of which motivate further exploration and developments.

With regards to technical innovation, an interest in the possibility of infinite generation can be observed at different points in the trajectory of developments in generative modelling, with its clearest manifestation in the latest era of large multimodal models. Ever since the introduction of the GAN framework, the appeal of generating novel yet coherent outputs led to continuous technical refinements allowing for more sophisticated visual and music outputs. Some notable improvements in GAN-based image generation include: the ALIS framework for infinite horizontal image expansion;<sup>57</sup> and InfinityGAN, an image synthesis model addressing the constraints in pixel resolution of images produced by prior models, and demonstrating a capacity to ‘infer a compelling global composition of a scene with realistic local details’,<sup>58</sup> and to achieve ‘high-quality, seamless and arbitrarily-sized outputs with low computational resources’.<sup>59</sup> Parallel examples can be found in GAN-based music generation, such as Musika, an ‘infinite waveform music generation’ system, proposed as an improvement on the output length limits of its predecessors.<sup>60</sup> Other methods mobilised towards the pursuit of ‘infinite’ image synthesis have also been proposed by recent projects such as Infinite Nature<sup>61</sup> and NUWA-Infinity.<sup>62</sup>

A further expansion of possibilities was brought about by advancements in diffusion models, which gradually outperformed GANs in creative domains, and which facilitated the production of high-quality output using natural-language prompts. While the initial computational costs of diffusion models imposed significant constraints on the size and length of generated video and audio, subsequent latent diffusion models<sup>63</sup> were able to greatly reduce the computing power required to complete a wide variety of image-based tasks (including inpainting and outpainting), and set the stage for huge increases in the quality, length, and diversity of video and audio output. The major challenge in the continuous generation of audio and video has been the consistency and coherence of the resulting material, however even these difficulties are being progressively resolved by new research and technical refinements. Recent developments in text-to-video generation promise long, high-quality, coherent videos,<sup>64</sup> while latent diffusion techniques adapted for audio generation have also allowed for the production of full music tracks from text prompts.<sup>65</sup> What this means with regards to the pursuit of infinite generation is that technical limits related to the size, length, coherence, and continuity of outputs are being progressive-

ly exceeded. In other words, the idea of AI-generated infinite art is becoming less speculative and increasingly technically feasible.

There are also interesting scalar dynamics at play here. First, there is a distinct scalar disjunction at the centre of productive interactions with these models. On the one hand, these are large models, trained on enormous datasets, and requiring substantial computing power to be developed and operated, while on the other hand, these models typically require only a simple prompt-based interaction from the user in order to generate an impressive output. Second, there are certain temporal idiosyncrasies. The production capacity of these systems is now far greater than the required input: for example, Evans et al. demonstrate a 95-second stereo audio output from eight seconds of input,<sup>66</sup> while Liang et al. present a similar example in visual synthesis for video, with 60 frames generated from one single frame.<sup>67</sup> This increasing capacity for generating content of longer duration than the required rendering time is a peculiar characteristic that gives a sense of the production of time with these new technologies.

Moreover, generative models are trained on past data to produce potentially infinite output, and the spatial and temporal scales on which they can operate exceed the familiar limits of artworks, artists, or art exhibitions as typically conceived of. This tendency is well illustrated by some of the creative uses of GenAI that are animated by the infinite. In addition to open-ended outpainting and inpainting image-based practices, there are now also numerous infinite livestreams of AI-generated content, such as Twitch-based infinite TV show *Nothing, Forever*<sup>68</sup> and infinite assembly-line footage *FactoryFactory*,<sup>69</sup> or the previously-mentioned Dadabots' Relentless Doppelganger and AInfiniteTV. There is arguably a certain common quality that can be traced across these various creative practices and their outputs, perhaps best encapsulated by the term 'weird': the AInfiniteTV stream is generally representative of the aesthetics now commonly associated with popular text-to-image generators, characterised by relentlessly vivid colours, excessively smooth edges, and the occasional disconcerting deformations of faces and bodies; *Nothing, Forever* has been actively described by its creators as 'AI generated, always on, always weird';<sup>70</sup> while Dadabots describe the characteristics of their experimentation as 'solo vocalists become a lush choir of ghostly voices, rock bands become crunchy cubist-jazz, and cross-breeds of multiple recordings become a surrealist chimera of sound'.<sup>71</sup>

Nevertheless, what we are proposing here is that the key aspect that makes these projects a coherent phenomenon has less to do with the particular format, medium, or aesthetic they adopt, and more to do with how they are inspired by the infinite affordances of GenAI and by continuously exceeding prior limits. Popular platforms where AI art enthusiast communities gather and exchange ideas show numerous examples of projects where the infinite is the dominant motivation.<sup>72</sup> Moreover, this trend and the concept of the infinite have also gained a certain rhetorical currency. Despite the fact that the infinite streams and open-ended artworks do not actually continue indefinitely – platforms like YouTube do in fact impose limits on livestream duration, and the ML research discussed above is more focused on reducing existing limits and crossing technical hurdles than actually achieving infinite model output – the term ‘infinite’ is frequently used as a shorthand or a signifier for the motivation of such projects. As such, what we term the infinite paradigm is not simply a specific range of practices or formal characteristics, but rather a very broad and dynamic terrain that encompasses technical developments, their adoption in creative work, and shifting perspectives in cultural practices.

While there is no clear separation between the infinite paradigm and previous AI art practices, there are some important distinctions that need clarifying. First, some of the earlier uses of AI for the purpose of generating potentially infinite new pieces in the style of a particular artist – for example projects such as DeepBach,<sup>73</sup> which can generate unlimited chorales in the style of Johann Sebastian Bach – remain largely committed to more traditional conceptions of artistic value, given that such projects are based on emulating a well-known and traditionally acclaimed canon. Second, an interest in open-endedness can be observed in a number of artworks and artistic practices that have been embraced by the AI art discourse – such as Mario Klingemann’s *Memories of Passersby I*, which is a wooden console connected to two large screens each of which projects an infinitely changing series of AI-generated faces; or Robbie Barrat’s *Infinite Skulls* (2019), which produces a new unique skull image at the push of a button – however, they are typically discussed in terms of the specific and unique elements of the artworks, and the vision and motivation of individual artists. While images in Klingemann’s *Memories of Passersby I* may continue indefinitely and never repeat, the console-and-screen setup is discrete, only a limited number of

editions were made, and the catalogue entry makes clear that although infinite, the precise images shown on the screen will be unique.<sup>74</sup> Consequently, the particularities of the examples outlined here still make them amenable to an outlook on art premised on operative categories such as the artist's intentionality and the artwork's uniqueness. By contrast, phenomena such as infinite livestreams, and the general overarching capacity of foundation models for continuously producing new and unexpected artworks, do not fit neatly within the traditional analytical frameworks of AI art discourse.

## The infinite as paradigm

The above discussion leads us to the final crucial junction in our argument: the framing of the infinite as a new paradigm that does not seek to make the current paradigm obsolete. We anchor our thinking in the most common understanding of the role of paradigms (derived from Kuhn<sup>75</sup>), seeing their function as designating sets of theories, procedures, and reference points that find broad consensus across a field, and as serving to define the principle motivating questions and acceptable approaches within a given domain. Kuhn's ideas about scientific paradigms have also been widely taken up by scholars working in the theory and history of art.<sup>76</sup> While many such accounts commonly acknowledge the important distinctions between science and art – generally framed as a difference between explorations of nature rather than culture, or the search for truth rather than beauty – they still argue for the relevance of Kuhn's analysis for understanding art history. Much like in science, an artistic paradigm serves to 'define the puzzles to be solved and the techniques or concepts most helpful in resolving them',<sup>77</sup> and scholars who frame the shifts from one artistic paradigm to another in Kuhnian terms often point to the exhaustion of the capacities of the previous paradigm to answer the discipline's central questions.<sup>78</sup> For example, in early 20<sup>th</sup>-century music the 'destructiveness of chromaticism' was seen as a 'crisis of composition', and atonality was framed as a solution to that crisis;<sup>79</sup> while the Dutch art movement De Stijl was seen as arising out of discontent with earlier ways of doing art.<sup>80</sup> Specific paradigmatic artworks are also at times read as signs of 'cultural exhaustion', such as Marcel Duchamp's *Fountain* (1917), which brought 'into focus major issues which normally lie below

the surface, issues which need to be questioned'.<sup>81</sup> These various points of crisis and exhaustion in art are of course much less severe than crises in science, as Kuhn himself remarked:

because the success of one artistic tradition does not render another wrong or mistaken, art can support far more readily than science, a number of simultaneously incompatible traditions or schools [...] the end of the controversy often means only the acceptance of the new tradition, not the end of the old.<sup>82</sup>

Our own framing of the infinite as paradigm builds substantially upon this thinking, however we also seek to de-emphasise the idea of incompatibility. The paradigm shift that we distinguish has more to do with a shift in perspective, rather than a complete exhaustion of the productive capacities of existing AI art discourse. In our view, analyses focused on evaluating whether AI artworks and practices are creative or autonomous enough to count as art are mostly confined to the mesoscale of the artworld, whereas the infinite paradigm deprioritises the idea of art as driven by specific creative agents who produce unique artworks (typically personified by human artists and their aura of exceptionality), and instead shifts focus towards a more scaled-up view of culture. From this perspective, the various elements of GenAI-based creative pipelines can offer a speculative lens for examining broader dynamics of cultural production. For example, the model development process can help crystallise how creative ideas are always inherently related to some cultural context and are further shaped by subsequent influences and interactions: an initial curated dataset (in a sense a data 'canon') provides the basis for model training, abstract representations of the training data get embedded in the latent space of a model (in a sense creating an idiosyncratic cultural reservoir), and fine-tuning a pre-trained model can significantly alter its function and subsequent outputs, despite a shared 'foundation'. Consequently, prompting and prompt engineering can be understood not as a simple and unsophisticated practice but rather a dynamic mode of interaction with an unconventional cultural archive. Moreover, and crucially, by positing a potential abundance and open-endedness of creative content, the infinite paradigm invites new modes of experimentation and interaction with cultural reservoirs.<sup>83</sup> This more infrastructural view of culture highlights the relevance of approaches that treat art as a dynamic space of aesthetic information and a complex system,<sup>84</sup> and it invites an ongoing exploration of cultural dynamics revealed or created by

engagements with AI. Most importantly, since the infinite paradigm is motivated by exceeding prior limits, it is not a static phenomenon but rather a vector of expansion of the discursive framing of AI art.

As Bratton and Agüera y Arcas point out, there is a danger in restricting our discussions and imaginaries of AI to our current understanding of the function and the consequences of these technologies. This is a trap they call ‘premature ontologisation’<sup>85</sup> (a pun on ‘premature optimisation’ in software development), which involves moving too quickly from specific empirical observations to ontological judgements. A similar risk can be identified in discussions of generative models and AI art. While there is a wide range of undeniable concerns about these technologies that certainly should not be ignored,<sup>86</sup> discussions of AI art that predominantly focus on whether GenAI has its rightful place in the domain of art often fall into the trap of prematurely dismissing these technologies as uninteresting. Approaches that are too quick to judge GenAI aesthetics as derivative or unimaginative, and deny their cultural value on that basis, end up implicitly restricting the scope of future discussions based on a very narrow interpretation of these technologies and their capabilities at a given point in time (the same is true for accounts that are too quick to proclaim text-to-image systems as complete replacements for artists, and harbingers of the end of art). We suggest that an alternative position is worth exploring.

As AI technologies keep evolving, the task of engaging with their challenges at appropriate scales will continue to be increasingly important. In AI research, there are growing concerns about the capabilities of ever-larger models slowly plateauing (largely due to the continuous need for new data), with recent research suggesting that based on current increases in dataset size, models will soon require more data than humans have ever produced.<sup>87</sup> Synthetic data is frequently proposed as a solution, since it can be generated ‘at scale’, however, it is also increasingly recognised as a solution fraught with risks.<sup>88</sup> Researchers warn of ensuing risks such as ‘model collapse’ (when the data on which the model is trained is produced by other models, it can lead to ‘forgetting improbable events over time, as the model becomes poisoned with its own projection of reality’<sup>89</sup>), and ‘model autophagy’ (where a shortage of ‘fresh real data’ could lead to decreased quality and diversity of outputs of generative models<sup>90</sup>). Since AI technologies are increasingly consequential for cultural production, these issues and risks are

equally consequential for the domains of art and culture. A scaled-up view of culture as a potential reservoir of training data, model weights, and embeddings in latent space clarifies this interdependence.

In order to prevent the premature ontologisation of GenAI and its cultural consequences, a posture of openness to other scales and perspectives is paramount. The concept of the infinite is particularly helpful in adopting this posture. As DiCaglio points out:

Even infinite terms like the All contain within them the possibility of adding more. While infinite terms may seem totalizing, they are inherently built on this openness.<sup>91</sup>

He goes on to illustrate this claim with the famous thought experiment – Hilbert’s Hotel paradox – which explains mathematical ways in which it is hypothetically possible to keep adding more guests to a seemingly full infinite hotel. DiCaglio continues to explain that the infinite is a close accomplice of scale itself and of its capacity for discovering new relations: ‘scale performs a similar maneuver by fleshing out the All both by adding more scales at which new relations might be discerned as well as leaving open the very limits, spatially and temporally, where relations might be said to exist’.<sup>92</sup> The concept of the infinite in the infinite paradigm performs a similar function: it suspends a number of hypothetical boundaries of the scope of our future engagement with culturally-embedded AI technologies and allows for the consideration of new questions. Ultimately, what is at stake here is an engagement with the epistemic affordances of these new technologies and their associated practices.

In this article, we proposed the infinite paradigm as a framing for developing an understanding of recent progress in GenAI and its cultural consequences. We discussed how approaches to AI art that revolve around concepts such as creativity or agency, or are focussed predominantly on individual artists or artworks, often restrict the scope of engagement with large generative models in art. As these technologies are getting progressively more capable and refined, and the production of hypothetically infinite images and music from a single prompt becomes a feasible technical possibility, the scale of these new artistic phenomena moves beyond the pre-existing discursive limits. We have argued that the infinite paradigm offers

a shift of perspective and allows for a productive engagement with the scalar disjunction between the vastness of culture and the purported reductiveness of prompt engineering, as well as the temporal idiosyncrasies of infinite generative models. The infinite is a paradigm that is enabled by technical breakthroughs, operationalised through creative practices, and that allows for a possible reorientation of our current and future understanding of AI. Most importantly however, it is a ‘paradigm shift without crisis’.<sup>93</sup> We believe that the advent of foundation models does not negate the need for means for distinguishing between high art and media content within the artworld, and that art as we know it will rightfully continue, rather than be replaced by generative models. As such, the infinite should not be seen as a replacement for existing art paradigms, but rather a different perspective on the future possibilities for cultural practices in the age of AI.

## Authors

Magdalena Krysztoforska is a postdoctoral fellow at the Institute for Cultural Inquiry in Berlin and member of the Responsible Computing Group at the Max Planck Institute for Security and Privacy.

Oliver Kenny is Assistant Professor in Film and Media at the Institute of Communication Studies (ISTC) and member of the research lab ETHICS at the Université Catholique de Lille.


## References

AInfiniteTV, 2024: <https://www.ainfinite.tv> (accessed on 21 July 2024).

Alemohammad, S. et al. ‘Self-Consuming Generative Models Go MAD’, The Twelfth International Conference on Learning Representations, 2023.

Arriagada, L. ‘CG-Art: Demystifying the Anthropocentric Bias of Artistic Creativity’, *Connection Science*, 32, no. 4, 2020: 398-405.

## THE INFINITE AS PARADIGM

- Ashton, D. 'Creative Work and Artificial Intelligence: Imaginaries, Assemblages and Portfolios', *Transformations*, no. 36, 2022: 94-113.
- Audry, S. *Art in the age of machine learning*. Cambridge: MIT Press, 2021.
- Audry, S. and Ippolito, J. 'Can Artificial Intelligence Make Art without Artists? Ask the Viewer', *Arts*, 8, no. 1, 2019: 35.
- Bajohr, H. 'Dumb Meaning: Machine Learning and Artificial Semantics', *IMAGE*, 37, no. 1, 2023: 58-70.
- Baradaran, A. 'Towards a Decolonial I in AI: Mapping the Pervasive Effects of Artificial Intelligence on the Art Ecosystem', *AI & Society*, 39, no. 1, 2024: 7-19.
- Becker, H. *Art worlds*. Berkeley: University of California Press, 1982.
- Bender, E. et al. 'On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? ', Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency, 2021: 610-623.
- Blattmann, A. et al. 'Align Your Latents: High-Resolution Video Synthesis with Latent Diffusion Models', 2023 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023.
- Boden, M. *Creativity and art: Three roads to surprise*. Oxford: Oxford University Press, 2011.
- Bommasani, R. et al. 'On the Opportunities and Risks of Foundation Models', arXiv, 2022: <http://arxiv.org/abs/2108.07258>.
- Bratton, B. and Agüera y Arcas, B. 'The Model Is The Message', *Noema*, 12 July 2022: <https://www.noemamag.com/the-model-is-the-message> (accessed on 28 February 2024).
- Brook, T. 'Music, Art, Machine Learning, and Standardization', *Leonardo*, 56, no. 1, 2023: 81-86.
- Cascales, R. 'Interpreting AI-Generated Art: Arthur Danto's Perspective on Intention, Authorship, and Creative Traditions in the Age of Artificial Intelligence', *The Polish Journal of Aesthetics*, 71, no. 4, 2023: 17-29.
- Cavell, S. *Must we mean what we say?* Cambridge: Cambridge University Press, 2002.
- Celis Bueno, C. et al. 'Not "What", but "Where Is Creativity?": Towards a Relational-Materialist Approach to Generative AI', *AI & Society*, 2024: 1-13.
- Ch'ng, E. 'Art by Computing Machinery: Is Machine Art Acceptable in the Artworld?', *ACM Transactions on Multimedia Computing, Communications, and Applications*, 15, no. 2s, 2019: 1-17.
- Clegg, B. *A brief history of infinity: The quest to think the unthinkable*. London: Robinson, 2003.
- Clignet, R. *The structure of artistic revolutions*. Philadelphia: University of Pennsylvania Press, 1985.
- Coeckelbergh, M. 'Can Machines Create Art?', *Philosophy & Technology*, 30, no. 3, 2017: 285-303.

- Cope, D. *Virtual music: Computer synthesis of musical style*. Cambridge: MIT Press, 2001.
- Crawford, K. and Schultz, J. 'The Work of Copyright Law in the Age of Generative AI', *Grey Room*, no. 94, 2024: 56-62.
- Danesi, M. *AI-generated popular culture: A semiotic perspective*. Cham: Springer, 2024.
- Danto, A. 'The Artworld', *The Journal of Philosophy*, 61, no. 19, 1964: 571-584.
- Dhariwal, P. and Nichol, A. 'Diffusion Models Beat GANs on Image Synthesis', arXiv, 2021: <http://arxiv.org/abs/2105.05233>.
- DiCaglio, J. *Scale theory: A nondisciplinary inquiry*. Minneapolis: University of Minnesota Press, 2021.
- Dickie, G. *The art circle: A theory of art*. New York: Haven, 1984.
- Donnarumma, M. 'Against the Norm: Othering and Otherness in AI Aesthetics', *Digital Culture & Society*, 8, no. 2, 2022: 39-66.
- Doorman, M. *Art in progress: A philosophical response to the end of the avant-garde*, translated by S. Marx. Amsterdam: Amsterdam University Press, 2003.
- Echauri, G. 'Infinite Media: The Contemporary Infinite Paradigm in Media', *Convergence: The International Journal of Research into New Media Technologies*, 2023: 1-15.
- Epstein, Z. et al. 'Art and the Science of Generative AI', *Science*, 380, no. 6650, 2023: 1110-1111.
- Evans, Z. et al. 'Fast Timing-Conditioned Latent Audio Diffusion', arXiv, 2024a: <http://arxiv.org/abs/2402.04825>.
- \_\_\_\_\_. 'Long-Form Music Generation with Latent Diffusion', arXiv, 2024b: <http://arxiv.org/abs/2404.10301>.
- Gioti, A. 'Artificial Intelligence for Music Composition' in *Handbook of artificial intelligence for music*, edited by E. Miranda. Cham: Springer, 2021.
- Goodfellow, I. et al. 'Generative Adversarial Networks', arXiv, 2014: <http://arxiv.org/abs/1406.2661>.
- Grba, D. 'Deep Else: A Critical Framework for AI Art', *Digital*, 2, no. 1, 2022: 1-32.
- Hadjeres, G. et al. 'DeepBach: A Steerable Model for Bach Chorales Generation', Proceedings of the 34th International Conference on Machine Learning ICML'17, Sydney, 2017.
- Hakopian, M. 'Art Histories from Nowhere: On the Coloniality of Experiments in Art and Artificial Intelligence', *AI & Society*, 39, no. 1, 2023: 29-41.
- Hassine, T. and Neeman, Z. 'The Zombification of Art History: How AI Resurrects Dead Masters, and Perpetuates Historical Biases', *Journal of Science and Technology of the Arts*, 11, no. 2, 2019: 28-35.

## THE INFINITE AS PARADIGM

- Heinich, N. *Le paradigme de l'art contemporain: structures d'une révolution artistique*. Paris: Gallimard, 2014.
- Herndon, H. and Dryhurst, M. 'Infinite Images and the Latent Camera', Herndon Dryhurst Studio, 2022: <https://hd-mirror.xyz/eZG6mucl9fqU897XvJs0vUUMnm5OITpSWN8S-6KWamY> (accessed on 12 September 2023).
- Hertzmann, A. 'Can Computers Create Art?', *Arts*, 7, no. 2, 2018: 18.
- Ho, J. et al. 'Denosing Diffusion Probabilistic Models', Proceedings of the 34th Conference on Neural Information Processing Systems (NeurIPS 2020), 2020.
- Hoelscher, J. *Art as information ecology: Artworks, artworlds & complex systems aesthetics*. Durham: Duke University Press, 2021.
- Hutson, J. et al. *Creative convergence: The AI renaissance in art and design*. Cham: Springer, 2024.
- Jiang, H. et al. 'AI Art and Its Impact on Artists', Proceedings of the 2023 AAAI/ACM Conference on AI, Ethics, and Society, 2023.
- Jones, C. 'The Modernist Paradigm: The Artworld and Thomas Kuhn', *Critical Inquiry*, 26, no. 3, 2000: 488-528.
- Kim, J. et al. 'FIFO-Diffusion: Generating Infinite Videos from Text without Training', arXiv, 2024: <http://arxiv.org/abs/2405.11473>.
- Kingma, D. and Welling, M. 'Auto-Encoding Variational Bayes', arXiv, 2014: <http://arxiv.org/abs/1312.6114>.
- Kogler Junior, J. 'Artificial Intelligence Art and Aesthetics: Can Machines Be Artists? – A Point of View Based on Peircean Semiotics', *Semeiosis - Transdisciplinary Journal of Semiotics*, 11, no. 1, 2023: 114-125.
- Kubler, G. *The shape of time: Remarks on the history of things*. New Haven: Yale University Press, 2008.
- Kuhn, T. *The structure of scientific revolutions*, second edition. Chicago: University of Chicago Press, 1970.
- \_\_\_\_\_. *The essential tension: Selected studies in scientific tradition and change*. Chicago: University of Chicago Press, 1977.
- Lee, H. 'Rethinking Creativity: Creative Industries, AI and Everyday Creativity', *Media, Culture & Society*, 44, no. 3, 2022: 601-612.
- Liang, J. et al. 'NUWA-Infinity: Autoregressive over Autoregressive Generation for Infinite Visual Synthesis', 36th Conference on Neural Information Processing Systems (NeurIPS 2022), 2022.
- Lin, C. et al. 'InfinityGAN: Towards Infinite-Pixel Image Synthesis', International Conference on Learning Representations (ICLR), 2022.

- Liu, A. et al. 'Infinite Nature: Perpetual View Generation of Natural Scenes from a Single Image', 2021 IEEE/CVF International Conference on Computer Vision (ICCV), 2021: 14438-14447.
- Liu, H. et al. 'AudioLDM: Text-to-Audio Generation with Latent Diffusion Models' in Proceedings of the 40th International Conference on Machine Learning 202, 2023: 21450-21474.
- Liu, R. et al. 'Best Practices and Lessons Learned on Synthetic Data for Language Models', arXiv, 2024: <http://arxiv.org/abs/2404.07503>.
- Lnyan. 'Lkwq007/Stablediffusion-Infinity', 2022: <https://github.com/lkwq007/stablediffusion-infinity> (accessed on 22 July 2024).
- Lomas, A. 'On Hybrid Creativity', *Arts*, 7, no. 3, 2018: 25.
- Lovejoy, M. *Digital currents: Art in the electronic age*. New York: Routledge, 2004.
- Lupinacci, L. "Absentmindedly Scrolling through Nothing": Liveness and Compulsory Continuous Connectedness in Social Media', *Media, Culture & Society*, 43, no. 2, 2021: 273-290.
- Manovich, L. 'AI and Myths of Creativity', *Architectural Design*, 92, no. 3, 2022: 60–65.
- \_\_\_\_\_. 'AI Image Media through the Lens of Art and Media History', *IMAGE*, 37, no. 1, 2023: 34-41.
- Mazzone, M. and Elgammal, A. 'Art, Creativity, and the Potential of Artificial Intelligence', *Arts*, 8, no. 1, 2019: 26.
- McCormack, J. et al. 'Is Writing Prompts Really Making Art?' in *Artificial intelligence in music, sound, art and design*, edited by C. Johnson et al. Cham: Springer, 2023.
- megalon2D. 'FactoryFactory', Twitch, 2023: <https://www.twitch.tv/factoryfactory> (accessed on 22 July 2024).
- Messer, U. 'Co-Creating Art with Generative Artificial Intelligence: Implications for Artworks and Artists', *Computers in Human Behavior: Artificial Humans*, 2, no. 1, 2024: 100056.
- Meyer, R. 'The New Value of the Archive: AI Image Generation and the Visual Economy of "Style"', *IMAGE*, 37, no. 1, 2023: 100-111.
- Moruzzi, C. 'Creative AI: Music Composition Programs as an Extension of the Composer's Mind' in *Philosophy and theory of artificial intelligence*, edited by V. Müller. Cham: Springer, 2018.
- Murray, M. 'Tools Do Not Create: Human Authorship in the Use of Generative Artificial Intelligence', *Journal of Law, Technology, & the Internet*, 15, no. 1, 2024: 76.
- Natale, S. and Henrickson, L. 'The Lovelace Effect: Perceptions of Creativity in Machines', *New Media & Society*, 26, no. 4, 2024: 1909-1926.
- Nordström, P. et al. 'Evolving Coagency between Artists and AI in the Spatial Cocreative Process of Artmaking', *Annals of the American Association of Geographers*, 113, no. 9, 2023: 2203-2218.

## THE INFINITE AS PARADIGM

- OpenAI. 'Video Generation Models as World Simulators', OpenAI, 2024: <https://openai.com/index/video-generation-models-as-world-simulators/> (accessed on 21 July 2024).
- Pajkovic, N. 'Algorithms and Taste-Making: Exposing the Netflix Recommender System's Operational Logics', *Convergence: The International Journal of Research into New Media Technologies*, 28, no. 1, 2022: 214-235.
- Pasini, M. and Schlüter, J. 'Musika! Fast Infinite Waveform Music Generation', Proceedings of the 23rd International Society for Music Information Retrieval Conference, 2022.
- Pasquinelli, M. and Joler, V. 'The Nooscope Manifested: AI as Instrument of Knowledge Extractivism', *AI&Society*, 36, no. 4, 2021: 1263-1280.
- Radford, A. et al. 'Improving Language Understanding with Unsupervised Learning', 2018: [https://cdn.openai.com/research-covers/language-unsupervised/language\\_understanding\\_paper.pdf](https://cdn.openai.com/research-covers/language-unsupervised/language_understanding_paper.pdf).
- RELENTLESS DOPPELGÄNGER, 2024: [https://www.youtube.com/watch?v=JF2p0Hlg\\_5U](https://www.youtube.com/watch?v=JF2p0Hlg_5U) (accessed on 21 July 2024).
- Rombach, R. et al. 'High-Resolution Image Synthesis with Latent Diffusion Models', 2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) New Orleans, 2022: 10674-10685.
- Rotman, B. *Ad infinitum... the ghost in Turing's machine: Taking God out of mathematics and putting the body back in, an essay in corporeal semiotics*. Stanford: Stanford University Press, 1993.
- Rust, R. and Huang, M. *The feeling economy: How artificial intelligence is creating the era of empathy*. Cham: Palgrave Macmillan, 2021.
- Schmid, A. and Hatchuel, A. 'On Generic Epistemology', *Angelaki*, 19, no. 2, 2014: 131-144.
- Shumailov, I. et al. 'AI models collapse when trained on recursively generated data', *Nature*, 631, 2024: 755-759.
- Skorokhodov, I. et al. 'Aligning Latent and Image Spaces to Connect the Unconnectable', 2021 IEEE/CVF International Conference on Computer Vision (ICCV), 2021.
- Smith, G. and Leymarie, F. 'The Machine as Artist: An Introduction', *Arts*, 6, no. 4, 2017: 5.
- Somainsi, A. 'Algorithmic Images: Artificial Intelligence and Visual Culture', *Grey Room*, no. 93, 2023: 74-115.
- Sotheby's. '(#109) MARIO KLINGEMANN | Memories of Passersby I', 2019: <https://www.sothebys.com/en/auctions/ecatalogue/2019/contemporary-art-day-auction-119021/lot.109.html> (accessed on 22 July 2024).
- Steinfeld, K. 'Clever Little Tricks: A Socio-Technical History of Text-to-Image Generative Models', *International Journal of Architectural Computing*, 21, no. 2, 2023: 211-241.

- Stewart, I. *Infinity: A very short introduction*. Oxford: Oxford University Press, 2017.
- Vaswani, A. et al. 'Attention Is All You Need' in Proceedings of the 31st International Conference on Neural Information Processing Systems (NIPS'17), 2017: 6000-6010.
- Villalobos, P. et al. 'Will We Run out of Data? Limits of LLM Scaling Based on Human-Generated Data', arXiv, 2022: <https://arxiv.org/abs/2211.04325>.
- Vinchon, F. et al. 'Artificial Intelligence & Creativity: A Manifesto for Collaboration', *The Journal of Creative Behavior*, 57, no. 4, 2023: 472-484.
- Wasielewski, A. *Computational formalism: Art history and machine learning*. Cambridge: MIT Press, 2023.
- WatchMeForever. 'Nothing, Forever', Twitch, 2024: <https://www.twitch.tv/watchmeforever> (accessed on 22 July 2024).
- Wiggins, G. 'Artificial Musical Intelligence: Computational Creativity in a Closed Cognitive World' in *Artificial intelligence and the arts*, edited by P. Machado et al.. Cham: Springer, 2021.
- Wilde, L. 'Generative Imagery as Media Form and Research Field: Introduction to a New Paradigm', *IMAGE*, 37, no. 1, 2023: 6-33.
- Zeilinger, M. *Tactical entanglements: AI art, creative agency, and the limits of intellectual property*. Lüneburg: meson press, 2021.
- Zukowski, Z. and Carr, C. 'Generating Black Metal and Math Rock: Beyond Bach, Beethoven, and Beatles', arXiv, 2018: <https://arxiv.org/abs/1811.06639>.
- Zylinska, J. *AI art: Machine visions and warped dreams*. London: Open Humanities Press, 2020.

## Notes

---

<sup>1</sup> Herndon & Dryhurst 2022.

<sup>2</sup> Ibid..

<sup>3</sup> Kingma & Welling 2014.

<sup>4</sup> Goodfellow et al. 2014.

<sup>5</sup> Vaswani et al. 2017.

<sup>6</sup> Ho et al. 2020

<sup>7</sup> Bommasani et al. 2022, p. 1.

<sup>8</sup> Cope 2001; Hadjeres et al. 2017.

<sup>9</sup> Lnyan 2022.

<sup>10</sup> *RELENTLESS DOPPELGANGER* 2024.

<sup>11</sup> AInfiniteTV 2024.

<sup>12</sup> OpenAI 2024.

<sup>13</sup> Kuhn 1970.

<sup>14</sup> The 'artworld' is a concept associated most closely with the work of Danto (1964), Becker (1982), and Dickie (1984), who propose that art should best be perceived as a collective process involving myriad participants (artists, curators, critics, teachers, distributors, exhibitors, etc.) and operating within specific historical and discursive contexts.

<sup>15</sup> Steinfeld 2023.

<sup>16</sup> Radford et al. 2018.

<sup>17</sup> Dhariwal & Nichol 2021.

<sup>18</sup> Steinfeld 2023.

<sup>19</sup> The boundaries of the term AI art are certainly fluid, however a definition provided by Zeilinger (2021) – 'digital art that incorporates technologies of artificial intelligence as a medium' (p. 12) – encompasses most of what AI art discourse is concerned with.

<sup>20</sup> To be clear, the broader debate around AI art also encompasses a number of other pressing issues, such as: the consequences of GenAI for intellectual property and copyright (e.g. Crawford & Schultz 2024); economic and labour issues (e.g. Pasquinelli & Joler 2021; Ashton 2022; Lee 2022; Celis Bueno et al. 2024); the ethical stakes and societal harms of GenAI (e.g. Bender et al. 2021); or the colonial legacy of the dominant Western art canon (e.g. Hakopian 2023; Baradaran 2024). While these are all deeply important issues, they are beyond the scope of this article.

<sup>21</sup> Rust & Huang 2021, p. 143ff; McCormack et al. 2023.

<sup>22</sup> Boden 2011.

<sup>23</sup> Pasquinelli & Joler 2021; Cascales 2023; Kogler Junior 2023; Vinchon et al. 2023; Hutson et al. 2024.

<sup>24</sup> Coeckelbergh 2017, p. 11.

<sup>25</sup> Audry 2021.

<sup>26</sup> Jiang et al. 2023; Hertzmann 2018.

<sup>27</sup> See McCormack et al. 2023; Hutson et al. 2024.

<sup>28</sup> Mazzone & Elgammal 2019.

<sup>29</sup> Lomas 2018.

<sup>30</sup> Smith & Leymarie 2017; Arriagada 2020; Gioti 2021.

<sup>31</sup> Zeilinger 2021; Nordström et al. 2023.

<sup>32</sup> Moruzzi 2018, p.69.

<sup>33</sup> Audry & Ippolito 2019, p. 7.

<sup>34</sup> Zylinska 2020, p. 12.

<sup>35</sup> Manovich 2022.

<sup>36</sup> Grba 2022, p. 17.

<sup>37</sup> Hakopian 2023.

<sup>38</sup> Brook 2023, p. 81.

<sup>39</sup> Donnarumma 2022, p. 51.

<sup>40</sup> Hassine & Neeman 2019, p. 29.

<sup>41</sup> Wasielewski 2023, p.123.

<sup>42</sup> Danesi 2024, p. 118.

<sup>43</sup> Natale & Henrickson 2024; Wiggins 2021; Messer 2024.

<sup>44</sup> Cascales 2023, p. 25.

<sup>45</sup> Ch'ng 2019.

<sup>46</sup> Manovich 2023, p. 41.

<sup>47</sup> Epstein et al. 2023, p. 1110.

<sup>48</sup> Bajohr 2023; Meyer 2023; Somaini 2023.

<sup>49</sup> Wilde 2023, p. 6.

<sup>50</sup> Stewart 2017, p. 1.

<sup>51</sup> Rotman 1993, p. ix.

<sup>52</sup> Clegg 2003, p. 2.

<sup>53</sup> Echaury 2023, p. 11.

<sup>54</sup> Pajkovic 2022, p. 227.

<sup>55</sup> Lupinacci 2021.

<sup>56</sup> Echaury 2023, p. 11.

<sup>57</sup> Skorokhodov et al. 2021.

<sup>58</sup> Lin et al. 2022, p. 2.

<sup>59</sup> Ibid.

<sup>60</sup> Pasini & Schlüter 2022.

<sup>61</sup> A. Liu et al. 2021.

<sup>62</sup> Liang et al. 2022.

<sup>63</sup> Rombach et al. 2022.

<sup>64</sup> Blattmann et al. 2023; Kim et al. 2024.

<sup>65</sup> H. Liu et al. 2023; Evans et al. 2024b.

<sup>66</sup> Evans et al. 2024a.

<sup>67</sup> Liang et al. 2022.

<sup>68</sup> WatchMeForever 2024.

<sup>69</sup> megalon2D 2023.

<sup>70</sup> WatchMeForever 2024.

<sup>71</sup> Zukowski & Carr 2018, p. 2.

<sup>72</sup> For example, a search for 'infinity AI' on Reddit brings up numerous projects:  
<https://www.reddit.com/search?q=infinity-ai> (accessed on 22 July 2024).

<sup>73</sup> Hadjeres et al. 2017.

<sup>74</sup> Sotheby's 2019.

<sup>75</sup> Kuhn 1970.

<sup>76</sup> Becker 1982; Clignet 1985; Jones 2000; Doorman 2003; Kubler 2008; Heinich 2014.

<sup>77</sup> Clignet 1985, p. 42.

<sup>78</sup> See Clignet 1985; Kubler 2008.

<sup>79</sup> Cavell 2002, p. 193.

<sup>80</sup> Doorman 2003, p. 115.

<sup>81</sup> Lovejoy 2004, p. 76.

<sup>82</sup> Kuhn 1977, p. 348.

<sup>83</sup> The possible instantiations of such practices extend far beyond what we can currently envisage, nonetheless some existing projects that we see as motivated by a similar orientation include: *xhairymutantx* by Herndon and Dryhurst, exploring a possible reversal of the dynamics at work in prompting large models, using the scalar heft of public participation and institutional authority to influence future GenAI training and resulting embeddings; *The Long Count* by Debit, using ML methods to enter into a speculative-archeological musical dialogue across vast timescales, from the ancient Mayan culture to contemporary electronic music scenes; or SEMILLA.AI, a dynamic interface for collective experimentation and interaction with the abstract patterns underlying musical styles, genres, and identities.

<sup>84</sup> See for example Hoelscher 2021.

<sup>85</sup> Bratton & Agüera y Arcas 2022.

<sup>86</sup> These include problems with bias, labour, data provenance, environmental costs, etc.; see note 20 for further details on the literature that engages with these issues.

<sup>87</sup> Villalobos et al. 2022.

<sup>88</sup> R. Liu et al. 2024.

<sup>89</sup> Shumailov et al. 2024, p. 756.

<sup>90</sup> Alemohammad et al. 2023.

<sup>91</sup> DiCaglio 2021, p. 50.

<sup>92</sup> *Ibid.*, p. 51.

<sup>93</sup> We borrow this particular phrase from Schmid & Hatchuel, who framed the approach they developed for a new way of thinking in epistemology and design theory called 'generic epistemology' as 'a paradigm-shift without crisis' (2014, p. 134). They frame the relationship between the approach they propose and the prior dominant approaches in the following way: 'There are two systems or two regimes of thought, which reveal other things to us.' (2014, p. 138) Our own thinking about the role of crisis and incommensurability in paradigm shifts is deeply indebted to Schmid & Hatchuel's work.