Artificial Creativity: A Process Philosophy of Technology Perspective

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ABSTRACT

In this paper I take a philosophy of technology approach to so-called "creative AI." In light of the disruptions promised by generative AI systems, I explore the way AI may give cause to develop a philosophical concept of creativity for the new technological milieu, beyond those often found in AI models, based on human psychology alone. Largely framed by the process thought of Alfred Whitehead, the paper first engages in a critique of human-centric accounts of creativity that are dominant in the AI field, and then explores the way a process philosophy of technology can describe emerging creativity-technology relationships. The conclusion of the paper is twofold: the first is that creative AI systems should embrace a more contingent and complex concept of creativity in order to produce "new, surprising, and valuable" objects in the world. The second is that one of the key roles of contemporary philosophy of technology is to rethink creativity as artificial in light of the potential of AI. Creativity is without a character of its own [...]. It is that ultimate notion of the highest generality at the base of actuality. It cannot be characterized, because all characters are more special than itself.

-Alfred North Whitehead, Process and Reality¹

In the early stages of *Process and Reality*, Alfred Whitehead lays out what he means by creativity. Creativity is, paradoxically, that which seems to resist its own explanation-it cannot, in Whitehead's words, be characterized because all characters are more specialised than creativity itself. It resists explanation because, for Whitehead, creativity is not one essential or specialised "thing." It only exists within conditions and is always *conditioned*, in that it is specialised only in its mode of actualisation, the way it is brought into being by entities in the world. But at the same time, it is also, for Whitehead, an activity that is at the base of actuality, it is where everything starts, it is responsible for novelty in the world-it both conditions and is conditioned by actual entities in the world. Creativity for Whitehead is definitely not a characteristic or essential quality of humans. It is instead something that comes before the human, but that might be conditioned by the human, and also conditioned by the social, economic, political, and technical context. It is a noun, a processually real "thing" in its own right, but it is only actualised in specific

¹ Alfred North Whitehead, Process and Reality (New York: The Free Press, 1978), 31.

examples of creativity in the world. It only exists when it is performed. It is, as Whitehead puts it, a "category of the ultimate."²

Whitehead's concept of creativity inspired some extremely novel thought in 20th and 21st century philosophy, some of which has shaped the field of the posthumanities, coming from figures such as Gilles Deleuze, Raymond Ruyer, Isabel Stengers, and Bruno Latour. Whitehead's approach to creativity, as something beyond the human, offered ways to conceptualise the production of novelty without recourse to anthropocentrism, which now becomes increasingly important as new technological developments promise to both disrupt and redefine the limits of the human.

In this paper, I take a philosophy of technology approach to creative AI and its relationship to humanism, asking two fundamental questions. The first of these relates to what can be meant by "creativity." This is a pressing question given artificial creativity systems currently aim at emulating what the human mind is supposedly doing in the creative process. The "brain as computer" metaphor of AI dominates concepts of creativity in this field, and characterises the "disruptions" to creativity that, as we are told, accompany new AI models. Perhaps though, a different concept of creativity needs to be developed in order to account for the potential of AI, rather than holding up the human role in the creativity circuit as a model. The second question relates to AI, and centres on the relationship between

² Whitehead, Process and Reality, 21.

the technical environment and so-called "creativity." It asks how AI may alter the terms of the relationship. My approach is largely framed by Whitehead and the way his work can be used in the philosophy of technology, particularly when creativity is concerned. The argument of the paper is twofold: (1) creative AI systems should embrace a more contingent and complex concept of creativity in order to produce "new, surprising, and valuable"³ objects in the world; and (2) one of the key roles of a contemporary philosophy of technology is to rethink creativity as artificial in light of the potential of AI. First, we will look at what can be meant by creativity, then we will look at how this might offer an alternative to dominant notions of creativity in AI. My ambition is not simply to oppose the ideology of AI, nor solely to critique its extractionist tendencies—although it is that too—but to enhance our understanding of creativity in the 21st century, the unrealized capacities of AI, and the way this may play out in material circuits for production.

Seeking to move beyond functionalist and output-oriented accounts, the notion of creativity that I am working with in this paper is materialist, similar to what Dan Harris defines as a "creative ecology" approach.⁴ Foregrounding the relational assemblages at work in the creative act, rather than one individual human mind—or computer—I use Whitehead to extend existing definitions within this domain. In some ways this is reminiscent of John Dewey's influential description of

³ See Margaret Boden, *The Creative Mind* (London and New York: Routledge, 2004).

⁴ Dan Harris, *Creative Agency* (Cham, Switzerland: Palgrave Macmillan, 2021).

creativity as an *event*, as a lived experience of inquiry.⁵ However, whereas Dewey still retains the human subject at the centre of the process, Whitehead gives us a way to talk about the becoming of the subject *as a result of* the creative process. More will be said on this as the essay progresses.

As well as materialist theories of creativity, another tradition of thought that influences my theoretical framing of creativity begins from a tradition that engages with the ancient concept of *techné*, and the notion of technology as a mode of "revealing." As is well known, in Heidegger, the concept of *techné* refers both to the techniques of manufacturing and the techniques of the arts. *Techné* signifies both a practice and a technical "know-how"; it is a process of making something present out of the "not-present," a "bursting forth."⁶ As Heidegger reads in the Greeks, *techné* involves humans, let's say a craftsperson, participating with other contributing elements such as matter (*hylē*), form (*eidos*), and the circumscribing grounds that "gives bounds to the thing," that give it its purpose (*télos*)." *Techné* then, is not just a means to an end, not just a way of "getting things done," is involved in a

⁵ John Dewey, Art as Experience (New York: Perigee Books, 2005).

⁶ Martin Heidegger, *The Question Concerning Technology and Other Essays* (New York: Harper and Row, 1977), 10.

⁷ Heidegger, The Question Concerning Technology, 7–8.

process of "bringing forth," it acts as a mode of "revealing," within a process of *poiēsis*, it is always on the edge of existence.⁸

In this context Whitehead can enrich the description of *techné* and its relationship to *poiēsis*—and can do so without Heidegger's negation of modern technology as a degeneration. This is largely because Whitehead's approach is cosmological, rather than phenomenological, and so displaces the subject from the centre of experience in ways that Heidegger cannot. Whitehead emphasises the material processes of creativity, the human and non-human communities in which it plays out, what he calls a "society of actualities," all of which influence one another. Like Heidegger, Whitehead's approach insists that creativity is located in humantechnology relations. Unlike Heidegger, and, as already mentioned, because his approach is based in cosmology rather than phenomenology, he does not need to situate modern technology as an enframing device, he does not need to bifurcate nature in order to be able to explore the essence of Being. Instead, his radical anti-Cartesian approach allows one to think of an undifferentiated creativity that is beyond, but also enriching to, the self.⁹ For both Heidegger and Whitehead, it does not make sense to speak of subject-object divisions. Both are always involved in the creativity of the world. Whereas for Heidegger, modern technology obscures the world, for Whitehead, one impinges on, struggles with, forms and informs the other.

⁸ Heidegger, *The Question Concerning Technology*, 10–12.

⁹ Nardina Kaur, "A.N. Whitehead," Deleuze Studies 8, no. 4 (2014), 542–568.

Whitehead then gives us a way to enhance our understanding of the humantechnology relation, one that avoids the bifurcation of human on one side and technology on the other; one that situates creativity as *concrescence*.

Ironically, the notion of creativity developed by both Heidegger and Whitehead is at odds with the notion of creativity that is seemingly driving the development of AI. This is ironic because as we enter an era where AI gives philosophers, artists, and scientists new ways to think about creativity as artificial, as an event, and as constituted within human-technology relations, in the popular imagination and in the scientific discourse on AI, we see precisely the opposite—a return to much more conservative models of creativity as situated in an "artistic genius," as an internal property, as a "natural" part of the self, as centred on the internalities of the human mind, which are then seen as a model for AI to emulate.

WHAT IS MEANT BY CREATIVITY?

The ambition of "creative AI" is to locate a uniquely human essence of creativity and to then develop AI systems capable of emulating the way this essence is expressed. The research field is an extension of earlier interests in the area of computational creativity, where artists and computer scientists tested the possibilities for computers to enter into creative circuits with humans.¹⁰ The major questions for the creative AI field concerns identifying the supposed "essential ingredients" of creativity, and uncovering what humans are doing consciously and unconsciously in the creative act.¹¹ More or less, this is a desire to locate the experiential states and attitudes that are thought to lead to the expression of creativity. After these questions have been explored, we are told, the next step is to build machines that can exhibit such states. Creativity is here seen as a product of the human, as an internal disposition, that results in particular performances or activities. This approach to creativity raises some important questions for the future of the arts and humanities, one of which is the risk of reducing so called "creativity" to uniquely "modern" ways of thinking based in cognitive science. This also risks restricting what is possible if, as is coming into view, AI is to transform what we think of as culture.

As AI models begin to impact our values, our cultural practices and our thought about ethics, the way that the apparatus of AI defines foundational processes such as creativity have significant implications, whether one believes that AI is creative or not. Many readers might be of the opinion that, for instance, an

https://philarchive.org/archive/FESCAI

¹⁰ See, for instance, Tony Veale and F. Amílcar Cardoso (ed.), *Computational Creativity* (Cham: Springer, 2019).

¹¹ Dessislava Fessenko, "Can Artificial Intelligence (Re)Define Creativity," (10 January 2022), *PhilPapers*, accessed April 8, 2024,

image generated by DALL-E 2 does not exhibit the same "creativity" as is found in human-produced art. However, creativity still remains to be defined *in relation* to AI, in as much as "creativity" is that which humans, but not AI are thought to be capable of. So of course, for those that believe AI is not creative, creativity becomes that which is beyond a machine. But is this conception of creativity, as something internal to human artists, reductive of the complexity of creativity as a philosophical concept? Is this how creativity is to be disrupted? Is this how, as Bernard Stiegler has argued, our selves, including our gestures to the future, become overtaken and progressively replaced by automatic protensions at an extreme stage of rationalization?¹²

How, then, to think differently? As is well known to many art theorists, educators, and philosophers, creativity is often described as socially constructed, transient, and highly context dependent. Rather than trying to get computers to emulate the so-called human essence of creativity, a more important project would be to think about how AI can lead to new forms of creativity, beyond those limited to the human, how this might *produce new forms of humanism*, and whether or not this is desirable. What then, could the technological disruption of creativity lead towards? How could this be made vital and meaningful as a technology of the self? How might it reframe what we once thought of and valued as the ability to

¹² Bernard Stiegler, *The Age of Disruption: Technology and Madness in Computational Capitalism* (Cambridge: Polity, 2019), 8.

negotiate, synthesize, antagonize, and sometimes redress the social milieu? Before moving on to explore how AI might be thought to exhibit "creativity" in this sense, first the field of AI research requires a critical treatment of what "creativity" might mean. We then will be in a better position to discuss how so-called "creative AI" may, in fact, give us new ways to think about the generation of texts, image making, imagination, and the performance of creativity in general.

As is often cited, creativity, as a term, is a relatively recent invention. The word was first used in the 19th century and is etymologically related to the 15th century Latin word *creare*, "to make, bring forth, produce procreate, beget, cause," which stems from the Proto—Indo—Europena *ker*—, meaning "*to grow*."¹³ These older notions of creativity bring to mind natural processes where a life takes shape and where patterns emerge in the natural world. In the 19th century, the word takes on a different meaning: "Creativity" is reinvented as a distinctly modern term. It is at the centre of the value-laden ideals of progress and innovation, now seen most acutely in the discourse that has been built up over the last thirty years or so surrounding the creative industries, whose values and economic ideals seem to be now adopted by research into generative AI. These includes things such as the

¹³ See the entry for "Creativity (adj.)," *Online Etymology Dictionary*, accessed April 8,
2024, https://www.etymonline.com/word/creative#etymonline_v_29034

hiding of labour perspectives and treating creativity as human capital and a generator of intellectual property.¹⁴

In relation to AI, creativity has been defined perhaps most influentially by Margaret Boden. According to Boden, creativity is a mental capacity that results in outputs that are "new, surprising and valuable." She writes "creativity enters into virtually every aspect of life. It's not a special 'faculty' but an aspect of human intelligence in general: in other words, it's grounded in everyday abilities such as conceptual thinking, perception, memory, and reflective self-criticism."¹⁵ For Boden creativity happens in "conceptual spaces," which could be summed up as the internalisation of those external factors that direct, limit, and constrain creativity things like fashion, or rules in a game, or other cultural factors. However, surprisingly, she does not give technologies, or the protocols and techniques that accompany them, any agency — for her it is instead a place to be explored by the autonomous human mind.¹⁶

Building on Boden's definition, Demis Hassabis—CEO and co-founder of DeepMind—defines characteristics of AI creativity as interpolative, extrapolative,

ed. Elliot Samuel Paul and Scott Barry Kaufman (New York: Oxford, 2014), 224–244.

¹⁴ Hye-Kyung Lee, "Rethinking Creativity: Creative Industries, AI and Everyday Creativity," *Media, Culture & Society* 44, no. 3 (2022), 601–612.

¹⁵ Boden, *The Creative Mind*, 1.

¹⁶ Boden, "Creativity and Artificial Intelligence," in *The Philosophy of Creativity*,

and inventive.¹⁷ Interpolative creativity explains a system where AI may make a creative decision based on previous experience. In a game of chess for instance, Deep Blue might make a move based on its reasoning about previous moves and its experience of previous games. Here, decisions are based on a domain that is bounded by things that have been done previously. In contrast, extrapolative creativity exists when AI makes entirely new decisions that are outside of the bounded domain of previous experience. They may produce something that is not simply based on the interpretation of previous data, but on something unexplainable. Inventive creativity involves inventing entirely new domains, entirely new rules, entirely new games, and entirely new ways of thinking. As Hassabis states, this is currently elusive to AI systems.¹⁸

Because creativity is described above by Boden and Hassabis as cognitive, and thus able to be represented by a functional set of criteria and outcomes, it seems logical that this would be able to be at least imitated by machines (in the sense of weak AI), if not fully integrated into their operation, with a machine indeed capable of creative thought (in the case of strong AI). But, as philosophers of technology well know, this is only one way to describe creativity, where the function of thought is

https://www.youtube.com/watch?app=desktop&v=d-bvsJWmqlc&t=30m00s

¹⁷ Demis Hassabis, "Creativity and AI—The Rothschild Foundation Lecture," YouTube (17 September, 2018), accessed April 8, 2024,

¹⁸ Hassabis, "Creativity and AI—The Rothschild Foundation Lecture"

attributed only to a single human mind. Often things are more complicated, with creativity taking place within a larger system of participating agents, where individuals negotiate with, are pressurised by, respond to, and create with a range of participating levels of agency. The question then is, is it an error that AI creativity reduces the complexity of the creative process, or is it a goal? As Wendy Chun has argued, AI tends to reduce complexity, to deal very badly with difference, and it is this that is its major threat.¹⁹ The task for philosophers is clear — to resist the bifurcation of the world by AI and to instead propose new ways of acting creatively.

In a post-graduate seminar room, after a lecture on media theory, a student suggested to me that creative AI seems to be doing something pretty close to what human artists do in the creative act: finding data, parsing that data, and making new artefacts as it puts things into new combinations. In other words, a bit from here, a bit from there, a quotation here, a paraphrase there—like the way all artists operate in their milieu. No doubt, this is a commonplace response. But it is also one that filled me with a sense of malaise. To paraphrase Friedrich Kittler, this response, common in the popular imagination, gives voice to the historic shifts in the discourse networks of our time: from creativity to data processing, from the arts to information

¹⁹ Wendy Chun, *Discriminating Data: Correlation, Neighbourhoods and the New Politics of Recognition* (Cambridge, MA: The MIT Press, 2021), 2.

technology.²⁰ "The real replaces the symbolic," as Kittler writes.²¹ My issue with this widely held assumption is two-fold: firstly, it mitigates the possibility of the radically new, the shock to thought. Deviations from the status quo, gestures towards the radically new, have never been achieved solely by the brain acting as a data processor. Secondly, it underplays the conditions for the possibility of action, the social place of actors, the unequal pressures on individuals, and imagines a universalism in the phrase "to create."

As has been already mentioned, Whitehead might give us an alternative. For Whitehead, it makes no sense to speak of the human mind at the center of experience. Instead, "mind" takes form based on the concrescence of many other actual occasions in the universe—and it is here, before the mind, where creativity takes place. He writes:

The Cartesian philosophy is based upon the seeming fact—the plain fact—of one body and one mind, which are two substances in casual association. For the philosophy of organism the problem is transformed. Each actuality is essentially bipolar, physical and mental, and the physical inheritance is essentially accompanied by

²⁰ Friedrich Kittler, *Gramophone, Film, Typewriter* (California: Stanford University Press, 1999), 73.

²¹ Kittler, Gramophone, Film, Typewriter, ?

a conceptual reaction partly conformed to it, and partly introductory of a relevant novel contrast, but always introducing emphasis, valuation and purpose. The integration of the physical and mental side into a unity of experience is a self-formation which is a process of concrescence, and which by principle of objective immortality characterizes the creativity which transcends it.²²

"Mind" and its modes of thought, for Whitehead, are an abstraction based on the actual occasions of experience. These occasions provide the conditions for creativity to *emerge from* and, at the same time, *transcend* these very conditions.

In approaches that follow on from Whitehead, the contribution of nonhumans to human experience are brought into more direct relief. For instance, Bruno Latour in his sociology of the science lab and his approach to material-semiotic relations,²³ as well as Michel Serres in his work on exchange, the quasi-objects, and exo-Darwinism,²⁴ have taken a similar approach to think about "novel

²³ Bruno Latour and Steve Woolgar, *Laboratory Life* (Princeton: Princeton University Press, 1986).

²⁴ Michel Serres, *The Parasite*, trans. Lawrence R. Schehr (Minneapolis: University of Minnosota Press, 2007); and Michel Serres, *Hominescence*, trans. Randolph Burks (London: Bloomsbury, 2019).

²² Whitehead, *Process and Reality*, 108.

togetherness"²⁵ in the making of both scientific facts and modern subjectivities²⁶ and even the making of the human itself, in the case of Serres.²⁷ Theorists such as Andy Clark have also viewed the human brain within an extended distributed system, which constitutes "the mind." The human brain is at the centre of the mind, but it is articulated to surrounding bodily capacities and external tools, including the digital computer. He writes:

such technologies, once up and running in the various appliances and institutions that surround us, do far more than merely allow for the external storage and transmission of ideas. They constitute [...] a cascade of "mindware upgrades": cognitive upheavals in which the effective architecture of the human mind is altered and transformed.²⁸

Or as Stiegler has argued, with the invention of mnemotechnologies in the late Paleolithic period (around 10,000 BCE) humans began to externalise and objectify cognitive capacities such as memory, assigning them to external tools and machines,

²⁵ Whitehead, *Process and Reality*, 21.

²⁶ See Bruno Latour, We Have Never Been Modern (Massachusetts: Harvard University Press, 1993).

²⁷ See Serres, *Hominescence*.

²⁸ Andy Clark, Natural Born Cyborgs (London: Oxford University Press, 2003), 4.

so that they now play a central role within the cognitive system.²⁹ These approaches to questions of the self are only possible after Whitehead's process philosophy, where he gave thinkers a way of talking about the manner in which objects in the world impose themselves on thought, the way they become immanent to subjectivities, rather than their being solely constituted by the language that we use to describe the world. This might help us to think in more nuanced ways about creativity, AI, human users, and the network of relations bound up in the performance of creativity. If we reframe the question, expanding the scope beyond the human and the mind, to consider other elements at work in the creative network, we might end up with a different explanation of creativity, one that is not solely located with the human, but also includes agents that are technical, economic, political, and social. To paraphrase Yuk Hui (2023), we might understand all creativity as artificial, in that it always originates in a network that involves more than the so-called "creative individual" or the "creative computer."³⁰ Creative AI should then be seen as the next addition to the technical and social milieu in which creative performance and creative "thinking" takes place. More will be said on this in the next section of the paper.

²⁹ Bernard Stiegler, "Memory," in *Critical Terms for Media Studies*, ed. W.J.T. Mitchell and Mark Hansen (Illinois: The University of Chicago Press, 2010), 66.

³⁰ Yuk Hui, "Imagination and the Infinite: A Critique of Artificial Intelligence," Balkan Journal of Philosophy 15, no. 1 (2023), 5–12.

If we accept that creativity might mean the generation of ideas that are "new, surprising and valuable," following Boden's output-oriented definition, then it is indeed quite possible that AI and computers more generally may exhibit "creativity," if they have not already. In fact, a number of existing computer systems (some quite old now), could be seen to demonstrate "new, surprising and valuable" information. Deep Blue, for example, could be thought of as creative, in that its moves were both new and surprising enough to beat Gary Kasporov in 1997. Many attributed Deep Blue's victory to move forty-four in the first game, where reportedly a bug caused it to make a surprising, and random, move, which Kasporov attributed to "creative thinking."³¹ An earlier example is Nimrod, one of the first computers designed to play games (though using logic gates, rather than AI), specifically the game of Nim. Built by Ferranti and exhibited at the Festival of Britain in 1951, Nimrod used mathematical logic to play Nim, a game where players take turns removing objects from a grid, with the goal to avoid taking the last object. As reported at the time by BBC journalist Paul Jennings, the computer was seen by the audience as an "electronic brain," both new and surprising in its proficiency at Nim and valuable in terms of the advances in computer power that this apparently

³¹ Jacob Roberts, "Thinking Machines: The Search for Artificial Intelligence,"

Distillations Magazine 2, no. 2 (2016), 14-23, accessed April 8, 2024,

https://www.sciencehistory.org/stories/magazine/thinking-machines-the-search-forartificial-intelligence/

"creative" thinking indicated.³² Of course, Nim's mathematical rules and Deep Blue's Bayesian structure (or decision trees) were not based on anything like the powerful black box artificial neural networks and generative adversarial networks (GANs) of today, but instead a static set of rules. However, in the socio-technical milieu of the time, they were a completely novel technological spectacles, that showcased the radically new affordances delivered by increased computing power.

In the art world, the computer art that emerged from art-technology collaborations at high tech institutions like Bell Labs and XEROX demonstrated similar experiments with computer programming and creativity. An early computer artwork that is closer to a complex, pragmatic, and co-constitutive version of creativity (although not using AI) is Charles Csuri and James Schaffer's computer art piece *Random War*. Built in the intellectual and experimental context of Bell Labs in the 1960s, Csuri and Schaffer began to use the computer's reliance on control and rules as a conceptual device. In 1967, while the Vietnam War was at its height, they made *Random War*, a computer programme that simulated a battlefield using the familiar figure of a child's green plastic toy soldier. Csuri made a drawing of the toy soldier, fed it into the computer as a data set and then allowed the computer to disperse the soldiers on the battlefield, using a random number generator. Based on a set of rules that interpreted the output of the random number generator, the

³² For more detail on Nim see "Nimrod," accessed April 8, 2024,

http://www.goodeveca.net/nimrod/

computer designated one side "Red" and the other "Black," and then determined (1) the Dead, (2) the Wounded, (3) the Missing, (4) the Survivors, (5) One Hero for Each Side, (6) Medals for Valor, (7) Good Conduct, and (8) Efficiency Medals, listed along with the computer-generated plotter drawing of little red and black army men. Random War is based on randomness and chance, with the output of the processes controlled by the computer's programmed rules, not on AI. However, the work produced new, surprising, and valuable results as a conceptual art piece that comments on the relationship between randomness, technology, programmability, and the Vietnam War. In the case of Nimrod, Deep Blue, and Random War, the computers were thought of as "creative" in that, within their context, they produced new, surprising, and valuable results. However, in the transformed technological milieu, with affordances that have changed vastly since Ferranti's Nimrod, these devices would now hardly be seen as creative, but rather the expression of the incremental development of computer engineering and ideas about just what constitutes creativity. After all, in all these cases it is not that the computer itself is *alone* creative, but rather that the output was seen as *an outcome of* creativity.

For Whitehead, these examples would demonstrate various levels of concrescence. The discoveries in computer engineering, the application of technical know-how, the context of the Festival of Britain, the rules of Chess, the collaborations at Bell Labs, the expectations of audiences, the operation of software, and many other actual occasions, contribute to make these events creative. They are artificial in the etymological sense of the word: they refer to something "made" or "done" through handicraft, through the application of "know-how," not through "nature." Intelligence is said to be artificial when natural "intelligence" is emulated by the work of computer engineers, cognitive scientists, and data scientists. By extension, it is presumed that creativity can be emulated in the same way. The problem is that, as we know from Aristotle onwards, human creativity is never completely natural, it should not be confused for emergence, it always involves levels of techné. Following Whitehead, it involves actual occasions at every level. The edge of existence, the moment of creativity, is never natural, but always incorporates the technical and social milieu. Creativity does not simply happen as data is collected, parsed, and put into new (perhaps unexpected) combinations. Instead, creativity happens as each occasion impinges on the other, each entity prehending those contemporaneous entities, with something novel conditioned in the process. New affordances are created as the creative act makes a deviation from the standard set of conditions.

In as much as creative AI involves the exploration of creativity by computational means, it has to be concerned with more-than-human creativity. It requires a more fundamental view of creativity, as the process by which new things are brought into the world, and a bringing into focus of associated ethical questions. As Oliver Bown writes, we require a broader view of creativity as the process of creating novel things, not limited to a suite of psychological capacities.³³ As already mentioned, Whitehead has set the conditions for a radically different reference point. For Whitehead, "creativity implies concrescence. Creativity is the universal of universals characterizing ultimate matter of fact. It is the ultimate principle by which the many, which are the universe disjunctively, become the one actual occasion, which is the universe conjunctively."³⁴ It emerges from the coming together of parts that were once separate and achieving a kind of self-creation, or self-determination. Whitehead here is of course not talking about anything as specific as, say, an author writing sentences, or DALL-E 2 generating images. He is instead talking synoptically about creativity and the becoming of what he terms "actual entities," as the smallest real things that make up the world. Creativity in this sense is evolutionary, it is about *ongoingness*. This is at the centre of Whitehead's philosophy, where he replaces Aristotle's category of "primary substance" with the notion of the "creative advance," the process of passage into what he calls "conjunctive unity." Although not centred on questions of human-technology relations, when applied in this domain, this approach can show us things about AI creativity, namely the

³³ Oliver Bown, "Generative and Adaptive Creativity: A Unified Approach to Creativity in Nature, Humans and Machines," in *Computers and Creativity*, ed. John McCormack and Mark d'Inverno (Berlin: Springer, 2012), 361-381. ³⁴³⁴ Whitehead, *Process and Reality*, 21.

importance of concrescence and the reasoning that is shared amongst a network of entities, rather than attributing creativity to a single internal disposition.

Let's briefly look at the machine learning pipeline to make this point. At the first point in the pipeline, a data scientist selects and extracts data, cleans up the data and prepares it for training the AI model. They then evaluate and validate the training, iteratively tuning the model. Let's say in this instance it is an AI for generating images. A human selects the images on which it is trained, evaluates that training, and, wittingly or unwittingly, ladens the AI with biases and a particular worldview, which tends to have more bearing on the outputs of the model than its algorithmic optimization.³⁵ Think, for instance of the well-known examples of racist facial recognition technology (FRT) that have been trained primarily on Caucasian faces.³⁶ At this stage of the pipeline, humans are very much involved in the creative process, they bring to bear value-laden decisions. After the manual stage, the pipeline becomes automated, and machine learning happens without human intervention, as the model becomes capable of training and retraining itself. As seen here, the creative circuit involves more than just the computer-as-brain. There are many other agents involved including the human data scientists that train the model, the data on which it is trained—which usually consists of artifacts produced

³⁵ E. Ratti and M. Graves, "Explainable machine learning practices: opening another black box for reliable medical AI," *AI Ethics* 2 (2022), 802.

³⁶ See, for instance, Chun, *Discriminating Data*, 20–22.

by human artists—and of course the hardware infrastructure that mediates the output—whether this is a screen, or a printer, or something else. At this point, the pipeline is akin to building a milieu for the machine. Those that build the milieu are also involved in the creative act of the machine, in as much as they are *part of* the creative machine, although this participation is often non-optional, particularly by the human artists that unwittingly provide data for the AI's training set.

We see varying levels of human-technology agency at play in the above example, as well as accompanying ethical questions around rights and some of the obscenity of situating creativity itself as a product. One of Whitehead's major concerns in *Process and Reality* is describing the process by which new things come into being, rather than describing the "things" themselves. In setting out his ontological principles in *Process and Reality*, Whitehead writes "there is nothing which floats into the world from nowhere,"³⁷ meaning that "creativity" alone is not enough to account for novelty, it is *conditioned*. This is seen acutely in the above example, where "artificial creativity" is conditioned by the way that it is built, which is always already part of any creative act that the model performs.

In Whitehead's language, creativity takes place at the stage where the togetherness of entities creates the environment, creates the occasions of experience:

³⁷ Whitehead, *Process and Reality*, 244.

the organisms can create their own environment. For this purpose, the single organism is almost helpless. The adequate forces require societies of cooperating organisms. But with such cooperation and in proportion to the effort put forward, the environment has a plasticity which alters the whole ethical aspect of evolution.³⁸

Whitehead is, of course, discussing evolutionary becoming here, rather than the generative capacity of a technology trained to produce texts, music, or images, but the conclusions are the same. The creative act is not undertaken by the single organism, but by a society of actors that expose the metastability of the environment. As Haiming Went writes "Whitehead holds that things and events happen together with one another in an actual context. It is creativity that makes the One actualize its potentiality to become plurality; likewise, in this contextual process of diversification, the Many is synthesized into One in creativity."³⁹ Creativity, for Whitehead, is a product of process, it is something *in the world* not *in the mind* (and by extension, not in the machine).

³⁸ Whitehead, *Science and the Modern World* (Cambridge: Cambridge University Press, 1959), 140.

³⁹ Haiming Went, "One and Many: Creativity in Whitehead and Chinese Cosmology," *Journal of Chinese Philosophy* 37 (2010), 102–115.

AI, CREATIVITY AND THE PHILOSOPHY OF TECHNOLOGY

Describing creativity as complex, causal, and contingent, offers new ways to come to terms with what AI is doing in the world—and may, from a philosophy of technology perspective, give us a new way to approach John Searle's famous Chinese Room argument.⁴⁰ Previously, the question of "understanding" was a key concern in the philosophy of AI, asking whether or not it was possible for a computational system to achieve something that would be commensurate to what we mean when we talk about human "understanding." To think about "understanding" and information processing, Searle sets out a thought experiment where he is alone, locked in a room, with a series of instructions. Every so often a note is slipped under the door, written in Chinese. Searle does not understand the Chinese characters, but the series of instructions tells him how to respond to each note, which he then slips back under the door. The Chinese speakers outside the room, receiving his responses would mistakenly attribute an understanding of Chinese to the person in the room, whereas Searle is simply following a program. As is well known, there have been many challenges to Searle, most convincingly that Searle, locked in the room, is only one element in the system that processes Chinese

 ⁴⁰ John Searle, "Minds, Brains and Programs," *Behavioural and Brain Sciences* 3 (1980),
 417–418.

characters (the Central Processing Unit or CPU).⁴¹ This is often called the System Reply and suggests that while Searle locked in the room, as one component of a larger system, does not understand the meaning of the symbols, the larger system does. There have been many other challenges to, and defences from, Searle, but let us stick with the System Reply challenge as it is closest to what I am trying to argue about "creativity" and the way it may be reframed by the question of AI. If we replace "understanding" with "creativity" in the Chinese Room problem, and have Searle follow instructions to respond to prompts for images, sounds, text, or other creative decisions sent under the door, rather than Chinese characters, we might arrive at a fresh challenge. Namely, that creativity is not based on something solely internal to Searle, as the CPU in the machine, but rather that creativity also involves the rules, the set out of the room, the instructions, and the system of values held by those outside the room.

Let's use some of the earlier examples of creative computers to reconsider Searle's original thought experiment. If Searle is in a room, following instructions for playing the game Nim or for playing Chess, slipping notes under the door indicating

⁴¹ See, for instance, Ned Block, "Searle's Arguments Against Cognitive Science," in *New Views into the Chinese Room*, ed. John Preston and Mark Bishop (London: Oxford University Press, 2002), 70–9; and Jack Copeland "The Chinese Room from a Logical Point of View," in *New Views into the Chinese Room*, ed. John Preston and Mark Bishop (London: Oxford University Press, 2002), 104–122.

which move he takes, he could be thought to not only understand Chess and Nim but, if the moves surprise the people outside the room, he could be seen as a creative player. If, instead, the notes under the door were a list of names, and he then followed instructions to allocate each name to dead, wounded, Missing in Action, or awarded medals for valour, he could be seen by people outside the room as making a creative and critical comment on the random violence of the Vietnam War, although he never *intends* this. In all these cases creativity is *performed*. One would always accept that something creative has happened, in that something surprising, original, and valuable has taken place. This "creativity," however, is not possessed by the system *per-se*, but rather actualised in the field of potential. Creativity here occurs within and as a product of networks, rather than individual users. Following Whitehead, we might say that creativity is based on novel togetherness, it is an emergent property of the interactive process.⁴² If we think of the Chinese room as a technology for processing information and producing an output, the way we think of the computer as an information processing technology, it becomes less important whether or not information processing itself expresses creativity. What is more important is the way that it might impose itself on the performance of creativity, the way that it, to return to the beginning of this paper, provides the *conditions* for creativity to be actualised and provides a *conditioning to its* actualization.

⁴² Bown, Generative and Adaptive Creativity, 30.

Gilbert Simondon wrote that humans are not tool users, but tool inventors. "Man [sic] thus has the function of being the permanent coordinator and inventor of the machines that surround him. He is *among* the machines that operate with him."⁴³ The computer-based tools that humans have invented become so complex that we cease to understand them enough to know how to use them. Instead, as Sennet writes, we need to make intuitive leaps to learn to live amongst, and develop techniques with, these tools.⁴⁴ Culture, for Simondon, should not be a defence against technics, as he writes in the opening of On the Mode of Existence of Technical Objects. Instead, culture, and our way of reflecting on what we once thought made us human, must come to terms with technical objects as they are enmeshed in our system of knowing and creating, as part of our culture's body of knowledge and values, as Simondon puts it. Like Simondon, the paleo-anthropologist Andrei Leroi-Gourhan in his major work Gesture and Speech, suggested that human evolution takes place alongside technological evolution, with the development of the human linked to the freedom of the hands, which then could be externalised in other tools, in a process where the human extends their own organs into the world. Once humans started to walk in an upright posture, the hands were free to take on new roles, the

 ⁴³ Gilbert Simondon, On the Mode of Existence of Technical Objects (Minneapolis:
 Univocal Publishing, 2017), 18.

⁴⁴ Richard Sennett, *The Craftsman* (New Haven: Yale University Press, 2008).

mouth was freed from carrying, and could likewise take on new roles.⁴⁵ The point here is that, according to Leroi-Gourhan, humans externalise their functions, then must learn to live amongst these new devices, which allow the original to take on new roles. Ruyer would arrive at a similar formulation, suggesting that the embryo contains a vital energy that produces the organs—the brain, the liver, the stomach and by extension, also creates those external organs that we think of as technology.⁴⁶ Other philosophers like Stiegler and Hui have followed, suggesting that technology be understood through an organology, where life is conceptualised as both biological and technical elements in a recursive operation. Or, as Michel Serres writes in *Hominescence*, our technologies once developed to stand in for our own functions, depart from our body, take on their own lives and come back to us in a process of hominization.

In the continental tradition of the philosophy of technology reflected by the thinkers mentioned above, technology has a project, although one that is not directed towards any sense of finalism. Instead, it is conditioned and conditioning, directed towards the ongoing project of individuation. In other words, technology is seen as one part of the project of life, an element that is bonded to the becoming of subjects. The current problematic of creative AI is that it is a *technology without a*

⁴⁵ André LeroiGourhan, *Gesture and Speech* (Massachusetts: MIT Press, 1993), 19.
⁴⁶ Raymond Ruyer, *NeoFinalism* (Minneapolis: University of Minnesota Press, 2016), 45–67.

project. It is currently a technology *apart from* the self. For creative AI to function as what Michel Foucault famously called a "technology of the self"⁴⁷ it needs to engage with the creative milieu, as set out above, to act as more than a stand in for a painter's assistant, copying prior styles, but actually begin to suggest new ways to perform creativity to humans, to act as a part of the organs for creativity, including the imagination and also the ability to sense, respond to and manipulate the environment. If, following Whitehead, we view creativity as concrescence, and see AI as now contributing substantially to the conditions for this concrescence, it becomes all the more important that it is developed as a "technology of the self," as something that can create moments of exit from the dominant milieu, that can contribute to the radically new. Rather than creative AI emulating humans, a greater possibility would be for AI models to be seen as one element in the concrescence of the creative event, as a set of affordances that might make new things possible.

Well-known examples of so-called creative AI include the numerous AI "paintings," such as *The Portrait of Edmund de Belamy* (2018), or the images produced by DALL-E 2 software, which are based on the synthesis of existing data, using features found in a training set to produce an image that is new, in that it does not resemble any specific image in the data set, but that shares properties with them. Other examples are the painting robots such as Ai-Da, Harold Cohen's AARON, or the drawing robotic arms in Patrick Tresset's *Human Studies* series of works. The

⁴⁷ Michel Foucault, *Technologies of the Self* (London: Tavistock, 1988), 16–49.

robots in these works use visual perception algorithms to analyze their subject and create unique drawings based on mechanical observations. Ai-Da uses cameras in her eyes and AI to draw figures based on real world input, though she often abstracts these images, to some degree, based on what she has learnt to be aesthetically and institutionally valuable. In a Ted Talk in 2022 she even described her own style as "splintered and fractured" in a way that mimics the self-awareness of a human artist who practices intentionally, to produce stylistic images. Of course, this is not actual self-awareness—Ai-Da does not intend a style. Her speech is based on pre-loaded content, not on AI.48 Tresset's drawing robots consists of robotic arms holding a black Bic biro, attached to old school desks. These robots create portraits of human sitters, based on training in Trusset's own drawing style, that is modulated based on their technical constraints and the techniques of drawing afforded to the robotic arm. Likewise, AARON, built in 1973, consists of a robotic arm that holds a paintbrush and paints on canvas, based on its data set of figures in the world (i.e., size, shape, colour) and a set of rules written by Cohen. Like Ai-Da and Trusset's drawing arms, AARON does not intend a style, but is instead an expert system able

⁴⁸ Jessica Furseth, "AiDa" Kinfolk 53 (March 2020), accessed April 8, 2024, https://jessicafurseth.files.wordpress.com/2020/03/k35-aida.pdf

to synthesise information and generate images based on a set of rules, and it does this in direct and explicit collaboration with Cohen.⁴⁹

While these examples showcase the ability of AI to generate new and original content, the disruption of creativity that they represent is based on a certain dehumanising of what is thought to be a human process of creativity, treating creative practice as an amalgamation of data. The exploration of sets of data is certainly one element of the practical reasoning that is involved in any performance of creativity, but not that alone. Rather than pointing to the radically new, this type of artificial creativity points to the already existing, put into new combinations. It becomes a shadow of the revolutionary potential of creative practice, as DeCock,

⁴⁹ For the sake of simplicity, I've focused on AI that produces visual images, but there are many other examples that could also be used. For instance, AI-generated art can be found in the field of music composition. There is the work of Amper Music, an AI music composition platform that uses algorithms to analyze and generate original pieces of music, or OpenAI's MuseNet, a deep learning model capable of composing complete musical pieces in different styles and genres, or earlier there was David Cope's Experiments in Music Intelligence (EMI). Rehn and Berry put it.⁵⁰ Creativity here is domesticated into already known systems of value.

In order to think about creating AI models that might fulfil the promise of artificial creativity, the notion of deviation is important. The creative act takes one into the unfamiliar and often uncomfortable position of no longer responding to the dominant affordances in their world. The individual searches for new ways of doing things within new human-technology circuits. Vincent Blok has explained the notion of creativity as deviation using the example of the shift from the steam engine, as one technological affordance, to the combustion engine, as a radically new technological affordance only realised through a deviation from the dominant technical niche. He writes:

> Dissent and revolution indicate that creation does not only involve our responsiveness to new affordances in the environment to create new-to-the-world artifacts, but it also involves an act of ex-novation, i.e., an act of deviation from our adaptation to currently dominant human-technology relations (i.e., the world associated with the steam engine) to make way

⁵⁰ Christian De Cock, Alf Rehn, and David Berry, "For a Critical Creativity" in *Handbook of Creativity Research*, ed. Kerry Thomas and Janet Chan (Cheltenham, UK: Edward Elgar, 2013), 150–161.

for new affordances that human creativity did not take advantage of yet (i.e., the world associated with the combustion engine).⁵¹

We are precisely now at this point. A deviation is now promising to take place from our conception of the human-technology relationship, with AI technology such as machine learning, GAN's and neural networks making an abrupt shift in what is now conceivable and offering significantly new affordances. However, to make way for these, we need to move past the above examples, where AI models act as human artists, responding to the dominant niche.

We can see an examples of this much earlier than contemporary computer culture: knowledge was once the preserve of writing. History, at least in the West, was what was written down and stored in libraries. But, as Kittler famously argued, discourse networks changed character with the advent of electronic communication, film, and gramophone. History—and the "real"—was now whatever could be processed and stored by technological devices.⁵² The entirety of the knowledge industries, including schools, universities, publishers, and libraries re-stabilised themselves in response to these new technological affordances. Creative thinking, in

⁵¹ Vincent Blok, "The Role of Human Creativity in Human Technology Relations," *Philosophy and Technology* 1, no. 3 (2022), 58–59.

⁵² Kittler, Gramophone, Film, Typewriter

response, was now associated with ways of operating in this new context, rather than innovating within the old ways of doing things. The discourse networks shifted radically around 1900, and to innovate, to act creatively, it was not enough to simply rehearse ways of operating in 1800 (one need only look to the avant-garde movements of dada, surrealism, futurism, experimental cinema, French new wave, expanded cinema, and media art, to see how values and what is understood as the "creative act" changes with new institutional and technological contexts). We now find ourselves facing a similar need to respond to a new change in epoch.

To create new-to-the-world artifacts, attention now needs to shift from traditional models of innovation and the creative individual towards a deviation, towards a discarding of or radical departure from those old ideas. Ex-novation—the opposite of innovation— as Blok argues, is paradoxically required for creativity to flourish. Things like invention, experimental design, and creativity, require a particular technical milieu and a particular institutional milieu, in terms of a system of values, in order to flourish. But at the same time, these institutional, economic, and social forces cause standardisation of once creative products—think, for instance, of the iPhone, which has now settled into a more or less standard model. Innovation within this milieu will at some point reach a dead end, once noveldevices are now standard, affordances are exhausted or revealed to otherwise not be sustainable—all of which seem the case in current versions of AI.

To return to Whitehead, creativity exists as a performance when an actual entity is able to creatively reorganise its "prehension"—that is its perception and

integration of past experiences —in its action in the present. This is what Whitehead calls "concrescence" and refers to the process by which an actual entity integrates various past experiences, or prehensions, to form a new and unique experience. Each actual entity inherits a multiplicity of prehensions from its past, which it creatively reorganizes and combines in its concrescence to generate a novel experience—to create a deviation. While generative AI appears to integrate the past in an act of prehension, the potential to re-organise these prehensions is missing. The potential is missing to re-order the milieu, to escape and produce the new. In addition, the creative advance is placed within the processing of information by one individual entity (i.e., the particular AI system). For Whitehead, creativity is shared by every element in the cosmos, from the smallest subatomic particle to the human mind, with every actual entity participating in the creative process by contributing its unique perspective and novel arrangements of prehensions. The continuous transformation, what Whitehead calls "the creative advance into novelty" is missing in these technological disruptions, where creativity is seen as an internally bounded property of a singular entity (either a computer or a human mind).

In these cases, the AI or the human programmer selects the milieu, it does not impinge on them from the outside, it does not create the "shock" to thinking, or the disturbance, that is needed for the creative advance. Instead, it is deliberate and controlled: in creative AI models, the first decision of the supposed creative agent is to select the milieu in which they are operating, but this is rarely the case in the way actual creativity happens in the world. The AI model may exceed human capacities, and produce unpredictable outputs, but one asks the wrong question if they fixate on whether or not this emulates properties that were previously specialized to the human. Instead, we need a different language to start describing creativity after it has been disrupted by AI if we are exiting the era of creativity and entering the era of artificial creativity. In one sense, this new era exhibits a type of "brittle creativity" if we continue to think of creativity as a property of a single entity. AI creativity may be brittle if it is only creative in a very specific, self-selected institutional context. Moved to another context, whether this be institutional, social, or technological, they cease to function as creative machines. In another sense, to go beyond brittle creativity, we start to talk of "non-human creativity," where, after Whitehead, the creative advance of the universe takes place as new actual entities (in this case AI) reorganises prehensions of the world and allows humans to engage with the technological, social, cultural, and political milieu in new ways.

Now, at the end of this essay, we are in a position to see what "artificial creativity" might look like, if it is to move away from the banalities of "brittle creativity." First, although it is often hidden, "artificial creativity" involves human labour to train an AI model, including selecting and cleaning data, it also includes the data on which the model is trained, which often involves an archive of images, music, and texts. This labour should not be misconstrued as merely taking the place of a creative milieu, like for instance we usually consider Paris for Picasso, or New York for Lou Reed. Instead, the labour of humans is a process that gives form to the *techné* needed for the machine to create, it is like an element of learnt craftsmanship,

an element of "know-how." Just as *techné* cannot be separated from *poiēsis* in the labour of a craftsman, as Heidegger has argued, neither can this human-created *techné*, following Whitehead, be separated from the computer's poetics. This is not as simple an observation as it may seem, based on the machine learning pipeline sketched earlier in this paper. It is instead a redefining of "artificial creativity," following the process philosophy framework, and will, amongst other things, have significant regulatory implications: those that create the know-how can only be understood *as part of the creative machine*, and they require both compensation and that they have rights over how their images are used to train AI models.

The key notions introduced by a process philosophy approach to "artificial creativity" are: 1) the conceptualisation of the *techné-poiēsis* circuit shifts from ideas of *poiēsis* as usually understood as the domain of the creative individual, and of *techné* understood as technological. We now have a reversal: *techné* is able to be understood as that which is created by human engineers, data scientists, and artists, and *poiēsis* as that which is generated by algorithmic operations, which are often black-boxed from human users. 2) It is the novel togetherness of the human-technological relationship that constitutes "artificial creativity," not the outputs from the machine. And 3) This novel togetherness may represent a technology of the self—a technology used to represent, sustain and re-create the self—only if a way is found beyond the extreme rationalization of creativity and the automatic prohensions that mitigate deviation. This will be the ongoing struggle.