Transformations issue 36 (2022)
www.transformationsjournal.org

ISSN 1444-3775

AUTHOR BIO

Bojana Romic (Ph.D. in Media and Communication) is Senior Lecturer at Malmö University, Sweden. She was Marie Curie "Seal of Excellence" Fellow, working on the project "The Robot as a Technocultural Icon (Roboicons)" at School of Arts and Communication (K3), Malmö University (2019-2021). Her current research interests include creativity research, and socio-cultural imaginaries of robotic technologies.

It's in the Name: Technical Nonhumans and Artistic Production

Bojana Romic

ABSTRACT

In this conceptual article my aim is to challenge the attribute "creative" when applied to the technical nonhumans (computers, robots or AI). Whilst acknowledging the long history of technical objects involved in a creative production, I suggest that such phrasing carries a surplus of meaning that may lead to ambiguous and possibly deceptive narratives about technical nonhumans amongst non-professional audiences. I shall be using science and technology studies (STS) theories as a methodological backdrop, and I shall rely on the theoretical paradigms about the *myth of technology*.

KEYWORDS

computer creativity, AI, drawing robots, technical nonhumans, technological myth, science and technology studies (STS)

Introduction

The gallery visitor approaches an appropriated industrial KUKA robotic arm, shielded within a glass cube. The arm is placed on a pedestal, making the whole structure about 2m high. The arm is equipped with a writing device, and it writes lines on a roll of paper positioned in front of it. Once it is done writing eight statements, it cuts off the piece of paper. The paper falls on the floor for the audience to take.

Fig. 1 "Manifest" by robotlab. Photo Bojana Romic.

The installation *Manifest* is made by the German collective robotlab (2008). The robotic scribe writes sentences generated using a large database fed into its memory pool. [1] Each "manifest" is unique, and is written in English, German, or French. This artwork features the robot that is often referred to as a "creative machine" (Besold et al.; Bown) – a technical object that is invested in a cultural production, typically contextualised within an aesthetic context. In some cases, the object is part of a discursive system of an artwork, including performances and theatrical pieces. Over the last few years there has been a growing interest in the theme of so-called computational (or computer) creativity (CC), resulting in a number of both academic and journalistic articles (Pogue; Stock).

[1] An excerpt from the manifest no. *18814* I collected on 24.03.2018 read: "Just as instinct determines experience to a certain degree, experience also defines culture. Culture, however, is instinct." The last sentence stated: "Amateurs should be paid for their achievements."

The concept of CC is defined as "the use of computers to generate results that would be regarded as creative if produced by humans alone" (Besold et al.). This definition reveals a tension regarding the understanding of the concept of creativity when applied to nonhumans (with a focus on *technical* nonhumans). The tension arose within the CC and related research areas partially due to conceptual discrepancies between different academic fields. Contributions to the emerging field of CC have so far been provided by computer scientists (Colton), artists (Edmonds; Koh, Dunstan, Silvera-Tawil, Velonaki; Audry), cognitive scientists (Boden and Edmonds), engineers (Sato, Hayashi and Mizuuchi), art historians (Broeckmann), philosophers (Coeckelbergh; Gunkel; Still and d'Inverno), media scholars (Zylinska), and others. Each of these disciplines shines new light on this complex theme. However, the trouble lies in the fact that their respective contributions clash in the very understanding of what "creativity" is when discussed in the context

of nonhumans. These accounts can be grouped around two dominant ideological positions.

The first position is often held by computer scientists and engineers, and can be summarized as this: 1) Creativity is primarily a human attribute, but can be negotiated for some nonhumans (Bailey et al.; Kaufman et al.; Boden and Edmonds). The second position is informed by Mihaly Csikszentmihalyi's work on the social strand on creativity which instead thinks of creativity as "a system of mutual influences and information" (Bown 65). Csikszentmihalyi writes that any act, idea, or product is creative if it "changes an existing domain, or transforms an existing domain into a new one" (28). This approach is favoured within Science and Technology Studies (STS) researchers (especially amongst actor-network theory scholars) and can be formulated as follows: 2) Creativity is a socio-political construct that may involve humans and non-humans alike (Zylinska *AI Art*). As a researcher in the field of Social Sciences, I am ideologically close to the latter position, and I observe the term "creativity" through the prism of the STS perspective. Considering the history of nonhumans involved in a creative production, and the interrelations between all parties involved in a creative process, I revisit the role of language in communicating that process. Acknowledging that sociomaterial dynamic, I avoid the term "human-robot collaboration" (a technical nonhuman cannot wilfully accept its participation, therefore it is not truly a collaboration (see Seibt). Instead, I opt for terms such as "ensemble" (Zylinska *AI Art*) or "assemblage" (Flusser; Barad). In this context, an assemblage is defined as "the entangled state of agencies" (Barad 23). STS also considers histories of particular technologies, and the specific historical and socio-economic circumstances that have led to its implementation.

One of the aims of STS is to address the unsettling binaries such as nature/culture, human/nonhuman, us/other, where "the first term acts as the privileged referent against which the second is defined and judged" (Suchman). It has to be noted, though, that STS covers a variety of theoretical paradigms. In this work, I will draw specifically from the work by Donna Haraway, Sheila Jasanoff and Lucy Suchman, with added perspectives from Joanna Zylinska and Matteo Pasquinelli. I attempt to calibrate the concept of creativity in the context of technical nonhumans, and *discuss the role of language in the making of knowledge* (Adam 99). Further, I investigate processes of inheritance and reproduction of technological myths about nonhumans invested in the cultural production.

However, it is important to note that in this article, I do not address the question: *are* technical nonhumans creative? That question implies a pre-technological position that humans are the sole inventors and judges of any form of creative process (Zylinska, *AI Art*). This point will be explored on the next page. The focus of this article is on a different question: what happens when we *refer* to technical nonhumans as creative? I am interested in how those narratives are framed, and what conceptual complications such labelling may cause. Furthermore, I do not make any value judgements about the artifacts produced by AI/robots. The discussion about acceptance and validation by an artworld is beyond the scope of this article.

Even though the term "machine creativity" (Bown) is as common as the term "computer creativity" (and in many contexts they are synonyms) in this article I try to avoid using the word "machine" (except in quotes); instead, I refer to "technical nonhumans" or more specifically to "robots," "AI" or "computers." The term *technical nonhuman* relies heavily on Donna Haraway's understanding of nonhumans (*Modest_Witness@Second_Millennium*), here looking at a very particular group of objects that are invested in a cultural production. I am aware that such grouping of versatile technical objects may undermine subtle affordances that exist among them (notably, the embodiment of a robot and its absence in a computer program). However, I posit that the label "creative" extends these particularities. I have discussed the effects of an anthropomorphic design of the robot in one of my recent articles (Romic). In this paper, I broaden the focus and analyse creativity as a discursive feature, rather than a property of a human or a nonhuman.

Even though the term "machine" seems quite convenient to use due to its broad scope and a rich etymology, it tends to invoke a conceptual gap between a human and a technoscientific milieu. For Gilbert Simondon, a machine is ontologically and empirically different from a human, the latter being an "agent and translator of information … [who facilitates] a coupling between living and non-living" (XVI). Simondon further develops a very complex genealogy of technical objects, but he rejects the concept of a robot, describing it as a "fictious fabrication, an art of illusion" (Simondon 16). Simondon's critique is against the pretence that the robot has a special, even elevated status in comparison to a machine in a broad sense – producing a form of false hierarchy between technical objects. In Simondon's realm, there is a clear distinction between a human and a machine, humans and nonhumans.

In relation to this, Andreas Broeckmann notes: "the word *machine* marks the claim to an ontological difference which affirms the humanness of the speaker, and it disregards the possibility of a 'posthuman' entanglement with one's technological environment" (Broeckmann, "Machines vs. Robots" 4). The strict line between a "natural" human and an "artificial" machine becomes increasingly blurred in the Global North, where technoscience has infused all areas of life and society. Human life may be supported by pacemakers and respirators; the chemistry in the human brain may be altered by synthetically produced chemicals; the fertility cycle is controlled using contraceptive drugs; animal life is controlled through selective breeding and sterilisations; plant life is controlled through genetic modifications, and so forth (see Haraway "When Species Meet"). Humans are deeply entangled with the products of technoscience, on a social, physiological, habitual, financial, and intellectual level. Some authors insist that humans have always operated in an ensemble with a variety of nonhumans, both organic and inorganic: viruses, drugs, impulses, and various tools (Zylinska, *AI Art* 54). From that perspective, one could conclude that humans *are*, at least partially, machines (*ibid*; Brooks).

Discussing the Concept of Creativity

The concept of *creativity* is a highly contested one in Western thought. It may cover a broad span of activities including mundane ones (e.g. see Noam

Chomsky's analysis of a creative aspect of language: Chomsky; George Orwell's notions on "creative work": Orwell 184; "mass creativity," van Dijck and Nieborg). However, according to Andreas Reckwitz, the term "creativity" has become a pivotal organising principle in Western societies, represented by a desirable figure of a creative worker invested in the creative economy (26). [2] The regime of a permanent "invention," "novelty" and "improvement" sees creativity as a driving force in society, especially within the niche of the "experience economy." This argumentation suggests that semantics is tightly intertwined with societal practices, economics and importantly, politics (Stephensen). [3] A few authors have attempted to offer a timeless litmus test for creativity. For example, in her influential book *The Creative Mind: Myths and Mechanisms*, Margaret Boden offers three criteria for creativity: an idea or an artifact needs to be *new*, *surprising*, and *valuable*. Boden further calibrates this concept, offering additional criteria for the highest form of creativity – so-called *transformational* creativity. From an STS perspective, this view might be challenged due to its pretence for a set of universal rules to recognise and value creativity. As Reckwitz displays in his argumentation, creativity as a concept that is in use today has been invented in 20th century Europe. The repository of meanings conveyed by this concept shifted over time. From a romantic "genius" artist who is an outcast in a society, to a smart entrepreneur – the cultural construction of creativity moved fluidly from one opposite to another, depending on the socioeconomic circumstances of any given decade. Reckwitz thus criticizes the essentialist arguments about creativity, and stands for a structuralist approach: looking closely at the development of the concept, its embeddedness in media narratives, and relation to other sociocultural phenomena. How do computers/robots come into the picture?

[2] This trope has been heavily criticized by left-leaning academics such as Maurizio Lazzarato and Franco "Bifo" Berardi: the main source of complaint being that, under the shiny label of "creative class" (Florida) lies precarious work and blurring boundaries between work and leisure time.

[3] This trend has already been indicated in Walter Benjamin's influential essay "The Work of Art in the Age of Technological Reproduction," where he writes that the invention of film transformed the entire field of art, which became based on politics (instead of a ritual) (25).

The idea of a technical nonhuman producing an artifact is at least several centuries old, as Jaquet-Droz's automata *The Musical Lady* and *The Writer* (1770s) show. Throughout human history, various technical devices have been employed in the production of artworks. The examples include the use of the *camera obscura* for producing perspective in Vermeer's paintings (Steadman), the use of the *lanterna magica* as a means of producing audiovisual spectacle in the mid-seventeenth century (Grau), the use of the daguerreotype in the nineteenth century (Rosenblum), and so forth. These devices played a crucial role in the process of envisioning and producing artifacts; further experimentation and exploration of these technologies resulted in artifacts that would not have been produced otherwise. In many instances, the produced artifact involved an element of chance, something unintended that happened in a "black box" of the apparatus, or "contortions of technique": blurring, superimposition, etc. (Barthes 33). However, the use of such apparatuses was sometimes met with resistance: for example, the medium of photography was shunned as "non-artistic" by members of the pictorialist movement in the 1930s due to its technological basis (Nickel 549). This stance shows resistance toward human engagement with apparatuses, recognising value in the craft of a human hand, rather than in the conceptual facilitation and cognitive work involved in a creative process.

Throughout the 20th century, the relation between the artist and *technē* has been explored in a number of artworks. The examples include Raoul Hausmann's artwork *Mechanical Head (The Spirit of our Time)* made in the 1920s, László

Moholy-Nagy's kinetic sculpture *Light Prop for an Electric Stage (Light-Space Modulator)* (1930s) and Jean Tinguely's self-destructing installation *Homage to New York* (1960). Recent years have seen many notable attempts to involve AI and robots in an artistic production (e.g., robot *Shimon* (Georgia Tech), involved in the production of music; *6 robots named Paul* by Patrick Tresset, that produce drawings [4]; Agnieszka Kurant's 2021 *Adjacent Possible* (2021) where bacterial and AI agencies co-create "living pigments" (Segal). One of the pioneers of the field was Harold Cohen and the AI named *AARON*, involved in the production of paintings – Cohen experimented with this AI already in the early 1980s (Boden and Edmonds). Another well-known name is Leonel Moura, who started experimenting with the *ArtSbot* (art swarm robots) two decades ago (Moura). Moura's "artbots" are involved in a production of paintings and are designed to operate in a swarm-like fashion: they are equipped with sensors that react to the density of colour on a canvas, as well as each other (Moura). Robots' movements (and subsequently, traces of colour) cannot be anticipated in advance; however, it was a human artist who designed the pattern according to which the artbots operate. Hence, the painting comes as a result of a shared agency. This example illustrates Vilém Flusser's suggestion that the human and the apparatus are always locked in a dialogical *assemblage*, intertwined both materially and conceptually (113). In this sense, both human and nonhuman actors operate in unison as a sociotechnological entity (Weinbaum and Veitas).

Looking at the history of avant-garde movements and more recent tendencies in the artistic field, it could be argued that "the artistic discourse has consistently dismantled the myth of novelty in art and the artist as original creator" (Reckwitz 79). However, as Reckwitz notices, the "tradition of the new" has not disappeared – on the contrary, it has become an expected feature of art shows, which repositioned the role of the artist (from artist-as-creator to artist-as-facilitator) whilst visitors began taking an open and active role (ibid).

The introduction of technical nonhumans as participants in the process of creative production has thus not been a disruptive occurrence – not in a sense that Picasso's painting *Les Demoiselles d'Avignon* was, when it was first exhibited at the Salon d'Antin in 1916. In fact, I would argue that the introduction of technical nonhumans in the realm of "authorship" represents a form of normative continuum within art as a research field, which includes a commentary about the technoscientific surroundings.

Even before the advances in the fields of AI and ML (machine learning), the idea equivalent to the so-called *artificial creativity* was present in popular media and folk stories, thus nurturing the public imaginary. Take the example of the popular trope of a genie in a bottle: endless variations of the theme include several recognisable elements – a) the nonhuman can be summoned at will b) the nonhuman has a considerable power, which is somehow bound, or tamed, for the purpose of tasks that need to be performed c) the source of the power and resourcefulness of the nonhuman are mysterious and can be unpredictable, but the human orders the task, whilst the nonhuman executes it. Even though the genie seems to have endlessly greater faculties than a human, it simultaneously seems strangely incapacitated, since it cannot bring

[4] As Broeckmann observed, the material outcome of these robots' activity could almost be considered a form of photography (Broeckmann "Machines vs. Robots"). When we observe the totality of the process, the automatic operations that lead to specific *drawings* include a series of fine-tuned gestures, programmed to offer a particular type of representation. Similar to many other forms of media that reference the already established artistic medium, it asks a series of ontological questions, such as: "What is a drawing? Under which circumstances does a drawing stop being a drawing, and become something else?" (perhaps a photograph, as Broeckmann suggested), and importantly, "Who decides if a particular artifact is a drawing?" There are no universal answers to these questions, but they shed light on the functioning of ensembles between humans and nonhumans, and the dynamic of the art market that validates the artworks.

them into existence without a human order. This folk trope displays the myth of technology in a nutshell. The fantasy of the infinitely powerful, and yet impotent nonhuman which is dominated upon, represents a familiar binary that is being reproduced in media and popular culture. In the next section I will discuss this myth in more detail, as well as the role of language that contributes to this myth.

Mind the Language: the Technological Myth

The exploration of an idea of the technical nonhuman that produces artifacts goes in line with the existing myth surrounding the development of AI technologies since the early 1950s (Natale and Ballatore, Pasquinelli, Audry, and Broeckmann). This cultural myth included "a rhetorical use of the future, imagining that present shortcomings and limitations will shortly be overcome" (Natale and Ballatore 3), as well as a set of controversies that Natale and Ballatore see as an integral part of a discourse circulating around this myth. The AI myth could be seen as a repository of beliefs about "digital computer as thinking machines" (ibid, 4) and has been fuelled by various representations in popular culture (e.g., the computer *HAL 9000* in Stanley Kubrick's iconic movie *2001: A Space Odyssey* (1968)).

The technological myth has been ongoing since the early developments of the field after WW2. As Phillip Agre observes, some of the founders of AI were psychologists, and "they explained the field in terms of computer modelling of human thought processes" (135). Those early well-funded AI labs enjoyed a great deal of autonomy and their approach to the emerging field and vocabulary used describe the place of such technology within the broader worldview. Agre writes: "The metaphors provided by new technologies provided a means of placing mentalist psychology on a scientific basis, and a functionalist epistemology emerged to explain what it meant to offer mental mechanisms as explanations for experimental data" (136). This approach drew from Descartes' philosophy and its distinguished binary between *res cogitans* (thinking substance) and *res extensa* (material substance) (Descartes). In mechanical language, this translates into the well-known software/hardware dichotomy. [5] An important issue that Agre raises, is that in the early phases of the AI research, the goal-oriented words such as: "reasoning," "planning," "learning" served as a designing guidance and such descriptors have been widely applied to technological systems (see also Adam 101). Any conceptual complications that may have arisen when these formalisms have entered the vernacular field, would have been dismissed as irrelevant. This marks the rise of the AI technological myth. Agre reminds us that *AI is a discursive practice* (140), with apparent consequences for both the area of AI research and its application domains. [6] Natale and Ballatore posit that the myth affects culture and society at large, due to its narrative character: specific narratives circulate, they gain influence and dominance, shaping imaginaries about present and future technologies (5).

To illustrate the workings of this myth, I will provide an example from a book *The Artist in the Machine: The World of AI-Powered Creativity* by Arthur I. Miller. On page 52, he comments on the win of the AI "AlphaGo" over *Go* champion

[5] For a critical view of this dichotomy, consider this quote from Simon Penny: "As such, intelligence in a machine cannot be limited to its processor. To expand the vision further, the behavior of a machine – that is, its successful negotiation of tasks in an environment – demands a synchronisation of structural, electromechancial, sensing and computational elements. Thus its 'intelligence' is manifested in the interaction of digital reasoning, sensor functions, and material aspects. . . . Code must be informed by and constrained by physical form and dynamics. Hence the 'intelligence' of any robot is in part in its non-computational embodiment" (Penny, "Robotics and Art, Computationalism and Embodiment" 47).

[6] This quote from Herbert Simon illustrates the terminological conundrum that early AI engineers found themselves in:
"Our own research group at Rand and Carnegie Mellon University have preferred phrases like "complex information processing" and "simulation of cognitive processes." But then we run into new terminological difficulties, for the dictionary also says that "to simulate" means "to assume or have the mere appearance or form of, without the reality; imitate; counterfeit; pretend." At any rate, "artificial intelligence" seems to be here to stay, and it may prove easier to cleanse the phrase than to dispense with it. In time it will become sufficiently idiomatic that it will no longer be the target of cheap rhetoric" (Simon 4).

Lee Sedol: "AlphaGo *knew* that Lee would be caught entirely unawares. That was a killer move, a move no human player would have made" (emphasis mine). There is no doubt that the aforementioned move by AlphaGo was highly unconventional and unexpected. On the basis of that, some authors (like Miller) interpret this move as creative. Others have argued for different measures to evaluate affordances of AI, which are designed for pattern recognition (LaViers; Pasquinelli & Joler). While acknowledging that, "in controlled factory settings, robots can often outperform humans" (LaViers 1) scholars must be cautious not to make a fallacy of hasty generalisation and conclude that technical systems can replace the majority of the features of human cognition.

However, I want to attract the reader's attention to the second part of Miller's statement, about the idea that AlphaGo "knew" that Lee would be caught unawares. Obviously, the AI cannot *know* anything – it processes available data, and can come up with solutions that people *interpret* as unexpected. This is the point where the myth resides – it happens when we take the outcome of AI calculation for granted and then reverse-engineer the story that assumes a human model of strategising. In other words, there is an element of "anthropomorphising behaviour" of the technical nonhuman. It can be argued, then, that the use of common verbs for (human) abilities, such as "teach," "observe," "greet" etc., might not be adequate for technical nonhumans. [7] Johanna Seibt discusses this matter, applied to the case of social robots: "the use of intentionalist vocabulary, i.e. verbs that according to our common conceptual conventions imply consciousness, feeling, intentionality, free agency etc. confuses human perceptions of the robot, especially when such inappropriate framing is used within experimental studies" (135). Strictly speaking, a robot does not "greet," it only simulates a greeting – a collection of acts that people would interpret as a greeting (understanding that the act of greeting may differ in different cultures). The use of an intentionalist vocabulary and projections adds suspense to the story, even though the description and interpretation of an AI's actions can be deceptive. In line with this argument, Pasquinelli observes that:

> machine learns nothing in the proper sense of the word, as human does; machine learning simply maps a statistical distribution of numerical values and draws a mathematical function that hopefully approximates human comprehension. That being said, machine learning can, for this reason, cast new light on the ways in which humans comprehend. ("Abnormal Encephalization in the Age of Machine Learning" 9)

The problem with intentionalist vocabulary is that it always adds a *surplus of meaning* whilst obscuring the bigger picture of relations and circumstances that enable that technology in the first place. This surplus resides precisely in that gap between the *conceptual understanding of a human attribute* and an *instrumental use of the word* when applied to technical nonhumans.

Here is another example from Miller's book, which in my view feeds into this myth as well: "Could a computer … come up with a better keypad design or even a new theory of relativity or a *new style of art*?" (Miller XXV, emphasis mine). I am convinced that AI can be a helpful agent when designing a

[7] Some of these capacities can be applied to certain nonhuman animals. However, Seibt focuses here on an asymmetric communication between a human and a robot. The communication is inherently asymmetric because, in her view, a human behaves and the robot simulates.

keyboard, but the multifaceted concept of *style* involves many complex circumstances, and is not only a matter of recognisable expression. [8] The affordances of Generative Adversarial Networks [GANs]) have been explored in an attempt to produce "novel" art (Mahadevan). Applied to this context, Mahadevan defines it as a "generated sample that comes from a distribution different from the one used in training" (2). However, Pasquinelli and Joler posit that the result of that process does not go beyond detection of the old patterns from the training sample. For them, the key question is: "is machine learning able to create works that are not imitations of the past?" (13). For that reason, they suggest that the better term for so-called "AI art" would be *statistical art* (ibid). Such art is statistical in a sense that the technological system just detects the patterns from the sample, and delivers a randomized artifact based on the training data (see also Zylinska, *AI Art*). Hence, this dream about a computer inventing a new style of art seems far-fetched. Notice that in Miller's question, he thinks of artistic styles in essentialist terms, divorced from political circumstances, other developments in technology (as was the case of Impressionism as a response to the invent of photography) and artists' personal connections and networks. By doing so, he implicitly flattens historical narratives, resulting in a superficial discourse about technology.

[8] One of the dominant views on the concept of style regards it as a "set of qualities that is durable for a describable and discernible length of time" (Rump 50; see also Panofsky).

Let me return to Lucy Suchman's thought-provoking statement that I quoted previously: "[we should avoid binaries] … where the first term acts as the privileged referent against which the second is defined and judged" (140). Whilst I wholeheartedly agree with Suchman, it is concerning that many narratives about technical nonhumans use a crude language that infer human experiences, intellectual processing, and overall being-in-the-world. This occurrence Seibt refers to as "sociomorphing" (135) – using loaded language that may provoke unrealistic expectations from a nonhuman, painting a distorted picture about its affordances. [9] At the same time, as Katherine Hayles emphasizes, we need to acknowledge the *umwelten* of computational systems, their unique capacity of distilling patterns from a vast amount of data (51). Pasquinelli explains that this unique capacity of finding correlations, distilling patterns and forecasting tendencies gives shape to the abstract notions of Marx's general intellect, Foucault's episteme, and Simondon's transindividual (ibid 9).

[9] A related term is used by Pasquinelli, albeit with a different angle to it: drawing from Alan Turing's concept of Universal Machine (which should be able to replicate various forms of labour) he writes that "machine intelligence is not anthropomorphic, but *sociomorphic*: it imitates and feeds on the *condividual* structures of society rather than the individual ones" (Pasquinelli, "Abnormal Encephalization in the Age of Machine Learning" 6, emph. author). An interesting detail about both perspectives stands in regard to the myth of a machine as a common denominator – Seibt's focus on experimental practices and the loss of "synthetic modifiers" (LaViers 1) when referring to the affordances of a nonhuman is met with Pasquinelli's address of the processes of extractivism and accumulation of collected social data, and subsequent amplification of the inherent biases of the people who designed and implemented the technological system. Such massive databases collected by AI replicate the existing social structures of class, race and gender. (Buolamwini; Benjamin; Wachter-Boettcher).

At this point, the reader may ask: does it really matter if the description of a technical nonhuman is simplified, or even incorrect – is it really vital for a human participant to acknowledge the simulation of a greeting? The short answer would be: the incorrect portrayal of the affordances of a certain technology shapes imaginaries about the use of that technology. A kernel of deception that may occur when communicating technological advances via popular media may not be intentional: robots and AI have a rich cultural history in the domain of sci-fi, and that phantasmagorical side of a figure of a technical nonhuman influences the realm of *socio-technical imaginaries*. As Sheila Jasanoff explains, "socio-technical imaginaries are collectively held and performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff 4). Socio-technical imaginaries are different from the concept of a "discourse": aside from their focus on language they also include visions of various applications of technology at

present and in the future (Mossfeldt-Nickelsen 213). They may reinforce and reproduce the existing myths, representations and imagery already circulating in a society; in the case of robots and AI, we can find plenty of examples of films and literature featuring robot warriors, which reinforce a superficial human-robot dichotomy. The clichéd version of a narrative features a robot that finds a spark of "humanness" (i.e., conscience) within itself (e.g., *Terminator* (1984)). The opposite scenario has been explored as well, where a human is superficially "mechanicised." The good example is the episode *Man Against Fire* (2016) of the *Black Mirror* series, where a soldier experiences supressed empathy through a device that alters his perception of the world and verminises the enemy (de Matos Alves; Fisher).

One of the more interesting aspects of this superficial human/robot dichotomy relies on an idealised and static idea of a "normal" human – which, if we use the example above, would exclude individuals with certain psychological conditions (such as antisocial personality disorder). The reproduction of such mythical tropes that are already circulating in the popular media shape popular attitudes and sentiments toward technology. An important aspect of this is the choice of language used to describe phenomena.

As an added example, I will just briefly mention the robot Ai-Da (Aidan Meller Gallery/Oxford university). The robot is strategically presented as "the world's first ultra-realistic humanoid AI robot artist" (ai-darobot.com). The robot, which is afforded with a silicone face that resembles an adult woman, is equipped with technology that enables it to use cameras in its eyes, hold a pencil in its bionic hand, and draw portraits of people that stand in front of it (the link between the embodiment of this robot, and its affordances has been analyses in detail in my previous article, see: Romic). What I found problematic about the promotional narrative surrounding this robot is a form of *individuation* of a nonhuman in both anthropomorphic and sociomorphic manners. It is deliberately presented as a persona of sorts, as an *artificial human* – and an artist, on top of that. Within this narrative, Ai-da is presented as an electronic prodigy with philanthropic "views" of the world, a yet-to-be discovered favourite child of the artworld. The set of discursive strategies that built the myth of an electronic artist draws directly, I argue, from the existing socio-technical imaginaries: specifically, the imaginary about the Victorian genius artist (Romic 8; Reckwitz 33), coupled with an imaginary about the affordances of *artificial general intelligence* (AGI) (Pasquinelli "How a Machine Learns and Fails" 2). In this particular case, these strategies are employed in order to gain visibility and promote the robot as an actor within the art market. As Agnieszka Kurant observes: "Individualism is a capitalist invention … and the anthropomorphizing of AI as an individual intelligence is just a neoliberal concept forced on us to help with value extraction" (Kurant qtd. in Segal n.p.). While I support the initiative to include the artifacts produced by technical nonhumans in the art market, I find the promotional strategy of the humanoid Ai-da robot deceptive for the general audience. In my view, such strategy does not advance the discussion about technical nonhumans as cultural participants.

Humans and nonhumans in situated entanglements

Looking at the example of the artwork *Manifest* – mentioned at the beginning of this paper – one may wonder: what kind of creative activity is at stake here? At the first glance, the members of the audience do not have an active role in this performance. The robotic scribe determinedly writes words down on a sheet of paper, without any interference from the gallery visitors who are observing the process. When one "manifest" is done, the cut-out sheet falls on the floor, marking the moment of the subtle "nudge" – reminiscent of the times when letter-writing would have been a chosen form of communication, with all its asynchronous materialities and carefully crafted formulations. Who is this letter for? The gallery visitors recognise themselves as participants in this subtle performance. Bound by courtesy, in a casual demeanour, one of them would step forward and take the paper (are we supposed to take it? There are no other papers lying around). This play with a (mis)recognised social ritual has been explored within the context of robotic art (see, for example Norman White's *Helpless Robot*). However, instead of simulating a "quasi-biological condition" (a situation where the robot simulates animal behaviour) (Penny), the robot featuring in *Manifest* was not designed to actively seek contact with the audience. Instead, it *produces*. The artifact that is being produced is unique in terms of content, which presents an interesting commentary on the discourses surrounding originality and uniqueness within the art system. The creative activity of this performance is not limited to the actual production of these artifacts (manifests); for a gallery visitor, it encompasses the experience of being a "modest witness" (Haraway, *Modest Witness_Second Millenium*) of the act of creation, and the interpretative process of decoding the message (Hall). All participants of this subtle performance – human and nonhuman – find themselves in a situated entanglement (Haraway, *Modest Witness_Second Millenium* xxiii). In this dialogue of sorts, an interaction happens between our bodies, materials, abstractions, gallery spaces (Youngs). The artwork *Manifest* reminds us that "the current form of artmaking primes individual authors, but culture might evolve into different, more complex, hybrid, collective forms involving not only multitudes of humans but also machines, minerals, living organisms, and viruses. A polyphony of agencies" (Kurant qtd. in Segal n.p.).

Conclusion

In this article I have made an effort to contribute to the ongoing debate about the understanding of creativity in the context of technical nonhumans. Building on the scholarship of Haraway, Pasquinelli and Seibt, I suggest a review of the vocabulary which may contribute to the myth of technology and lead to ambiguous contexts. I posit that the phrase "creative robots" may be misleading in some popular contexts and instead I propose referring to them as "robots invested in a creative production." Although I keep referring to the narratives about robots involved in an artistic production as confusing for lay audiences, I believe that the root of the problem lies in this "untranslatability" of the concept of creativity in different academic research areas. This article aims to pinpoint the set of challenges that we are facing at this point of time, and start a dialogue.

Acknowledgments & Funding

I want to thank Bo Reimer, Erin Cory, Anuradha Reddy, Hugo Boothby, Line Henriksen, Pille Pruulmann Vengerfeldt, Tina Askanius and two anonymous reviewers for their helpful comments and suggestions. The research is supported by the Strategy Group for EU-Coordination, represented by Vinnova, Sweden.

Works Cited

Adam, Alison. *Artificial Knowing: Gender and the Thinking Machine*. Routledge, 1998.

Agre, Phillip, E. "Toward a Critical Technical Practice: Lessons Learned in Trying to Reform AI." *Social Science, Technical Systems, and Cooperative Work: Beyond the Great Divide*. Ed. Geoffrey C. Bowker et al. Psychology Press, 1997. 131-158.

Audry, Sofian. *Art in the Age of Machine Learning*. The MIT Press, 2021.

Balsamo, Anne. *Designing Culture: the Technological Imagination at Work*. Duke University Press, 2011.

Barthes, Roland. *Camera Lucida: Reflections on Photography*. Trans. Richard Howard. Hill and Wang, 1980.

Bailey, Aileen M., et al. "Approaches to the Study of Higher Cognitive Functions Related to Creativity in Nonhuman Animals." *Methods* 42.1 (2017): 3–11. https://doi.org/10.1016/j.ymeth.2006.12.003

Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Duke University Press, 2007.

Benjamin, Ruha. *Race After Technology: Abolitionist Tools for the New Jim Code*. Polity, 2019.

Benjamin, Walter. "The Work of Art in the Age of Technological Reproduction." *Illuminations*. Ed. Hannah Arendt, trans. Harry Zohn, Schocken Books, 1969.

Besold, Tarek, et al. (eds). *Computational Creativity Research: Towards Creative Machines*. Atlantis Press, 2015.

Boden, Margaret A., and Ernest A. Edmonds. *From Fingers to Digits: An Artificial Aesthetics*. The MIT Press, 2019.

Boden, Margaret A. *The Creative Mind: Myths and Mechanisms*. 2nd.ed., Routledge, 2004.

Bown, Oliver. *Beyond the Creative Species: Making Machines That Make Art and Music*. The MIT Press, 2021.

Broeckmann, Andreas. "Robots vs. Machines." Artificial Creativity conference, 19-20 November 2020, Malmö University, Malmö, Sweden. Keynote address.

---. "The Machine as Artist as Myth." *Arts* 8.1 (2019): 25. https://doi.org/10.3390/arts8010025

---. *Machine Art in the Twentieth Century*. The MIT Press, 2016.

Brooks, Rodney. *Robot: The Future of Flesh and Machines*. The Penguin Press, 2002.

Buolamwini, Joy. "Artificial Intelligence Has a Problem With Gender and Racial Bias. Here's How to Solve It." *TIME Magazine*, 7 Feb. 2019, https://time.com/5520558/artificial-intelligence-racial-gender-bias/ Accessed: 20 February 2022.

Chomsky, Noam. *Aspects of the theory of syntax*. The MIT Press, 1965.

Colton, Simon. "The Painting Fool: Stories from Building an Automated Painter." *Computers and Creativity*. Eds. Jon McCormack & Mark d'Iverno, Springer, 2012. 3-38.

Coeckelbergh, Mark. "Can Machines Create Art?" *Philosophy and Technology* 30.3 (2017): 285–303. https://doi.org/10.1007/s13347-016-0231-5

Csikszentmihalyi, Mihaly. *Creativity: The Psychology of Discovery and Invention*. Harper Perennial Modern Classics, 2013.

Descartes, René. *Meditations on First Philosophy. With Selections from the Objections and Replies*. Ed. John Cottingham, Cambridge University Press, 1996.

Edmonds, Ernest. "Algorithmic Art Machines." *Arts* 7.3 (2018): 1-7. https://doi.org/10.3390/arts7010003

Fisher, Mark. *K-Punk: The Collected and Unpublished Writings of Mark Fisher (2004-2016)*. Ed. Darren Ambrose and Simon Raynolds. Repeater Books, 2018.

Flusser, Vilém. *Into the Universe of Technical Images*. University of Minnesota Press, 2011.

Florida, Richard. *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community, and Everyday Life*. Basic Books, 2000.

Grau, Oliver. "Remember the Phantasmagoria! Illusion Politics of the Eighteenth Century and its Multimedial Afterlife." *MediaArtHistories*. Ed. Oliver Grau, The MIT Press, 2007. 137-162.

Gunkel, David J. "Special Section: Rethinking Art and Aesthetics in the Age of Creative Machines: Editor's Introduction." *Philosophy and Technology* 30.3 (2017): 263–265. https://doi.org/10.1007/s13347-017-0281-3

Hall, Stuart. "Encoding, Decoding." *The Cultural Studies Reader*, 2nd. ed. Ed. Simon During, Routledge, 1990. 507-517.

Haraway, Donna. *Modest_Witness@Second_Millennium. FemaleMan©_Meets_OncoMouse™ : Feminism and Technoscience*. 2nd. ed., Routledge, 2018.

---. *When Species Meet*. University of Minnesota Press, 2008.

---. *The Haraway Reader*. Routledge, 2004.

Hayles, Katherine."Can computers create meanings? A cyber/bio/semiotic perspective." *Critical Inquiry* 46.1 (2019): 32-55. https://doi.org/10.1086/705303

Jasanoff, Sheila. "Future Imperfect: Science, Technology, and the Imaginations of Modernity." *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Ed. Jasanoff, Sheila and Sang-Hyun Kim, The University of Chicago Press, 2015.

LaViers, Amy. "Ideal Mechanization: Exploring the Machine Metaphor through Theory and Performance." *Arts* 8. 67 (2019): 1-16. doi:10.3390/arts8020067

Kaufman, Alison B., Allen E. Butt, James C. Kaufman, & Erin N. Colbert-White. "Towards a Neurobiology of Creativity in Nonhuman Animals." *Journal of Comparative Psychology* 125.3 (2011): 255–272. https://doi.org/10.1037/a0023147

Koh, Jeffrey T. K. V., et al. (eds). *Cultural Robotics* (First International Workshop CR 2015). Springer, 2015.

Mahadevan, Sridhar. "Imagination Machines: A New Challenge for Artificial Intelligence." *32nd AAAI Conference on Artificial Intelligence, AAAI 2018*. 7988–7993.

de Matos Alves, Artur. "Mediated Verminisation." *Reading "Black Mirror": Insights into Technology and the Post-Media Condition*. Eds. German A. Duarte and Justin Michael Battin. Columbia University Press, 2021. 219-236.

Miller, Arthur. I. *Artist in the Machine: The World of AI-Powered Creativity*. The MIT Press, 2019.

Mossfeldt Nickelsen, Niels Christian. "Socio-Technical Imaginaries and Human-Robotics Proximity - The Case of Bestic." *Envisioning Robots in Society - Power, Politics, and Public Space*. Ed. Mark Coeckelbergh et al., IOS Press, 2018.

Moura, Leonel. Robot Art: An Interview with Leonel Moura. *Arts 7*.28 (2018): 1-5. https://doi.org/10.3390/arts7030028

Mumford, Lewis. *Technics and Human Development: The Myth of the Machine. Volume One.* A Harvest/HBJ Book, 1966.

Natale, Simone and Andrea Ballatore. "Imagining the thinking machine: Technological myths and the rise of artificial intelligence." *Convergence* 26.1 (2020): 3-18. https://doi.org/10.1177/1354856517715164

Nickel, Douglas R. "History of Photography: The State of Research." *Art Bulletin* 83.3 (2014): 548–558. https://doi.org/10.1080/00043079.2001.10786996

Orwell, George. *The Road to Wigan Pier*. Penguin Books, 1986.

Panofsky, Erwin. *Three Essays on Style*. Ed. Irving Lavin, The MIT Press, 1995.

Pasquinelli, Matteo. "Abnormal Encephalization in the Age of Machine Learning." *e-flux*, September 2016. 1-11.

---. "How a Machine Learns and Fails." *spheres*, #5. 2019. ISSN 2363-8621

Pasquinelli, Matteo and Vladan Joler. "The Nooscope Manifested: AI as Instrument of Knowledge Extractivism. *AI & Society* 36 (2021): 1263-1280. https://doi.org/10.1007/s00146-020-01097-6

Penny, Simon. "Robotics and Art, Computationalism and Embodiment." *Robots and Art: Exploring an Unlikely Simbiosis*. Ed. Damith Herath et al., Springer, 2016. 47-66.

Pogue, David. "Is Art Created by AI Really Art?" *Scientific American*. 1 Feb. 2018, https://www.scientificamerican.com/article/is-art-created-by-ai-really-art/ Accessed: 20 December 2021.

Reckwitz, Andreas. *The Invention of Creativity: Modern Society and the Culture of the New*. Polity, 2019.

Romic, Bojana. "Negotiating Anthropomorphism in the Ai-Da robot." *International Journal of Social Robotics*, June 2021. 1-11. https://doi.org/10.1007/s12369-021-00813-6

Rosenblum, Naomi. *World History of Photography*. 3rd.ed. Abbeville Press Publihers, 1997.

Rump. Gerhard Charles. "Commentary on the Book *The Concept of Style*." *Leonardo* 14.1 (1981): 48-50.

Sato, Tetsuro et al. "Painting Creation Method by Impression Feedback to a Painting Generator from an Impression Estimator." *25th IEEE International Symposium on Robot and Human Interactive Communication, RO-MAN*. 2016. 159–165. https://doi.org/10.1109/ROMAN.2016.7745105

Schfield, Damian, & LeRoy, Noelle C. L. (2018). "Representing Robots : The Appearance of Artificial Humans in Cinematic Media." *Journal of Arts and Humanities* 7.5 (2018): 12-28. https://doi.org/10.18533/journal.v7i5.1345

Segal, Noam. Systemic Errors of Collective Intelligence. A Conversation with Agnieszka Kurant." *Flash Art*. 336 Fall 2021. https://flash---art.com/article/agnieszka-kurant/

Seibt, Johanna. "Classifying forms and modes of co-working in the ontology of asymmetric social interactions (OASIS)." *Envisioning robots in society—power, politics, and public space/Proceedings of robophilosophy 2018/TRANSOR 2018*. Eds. Mark Coeckelbergh, Janina Loh, Michael Funk, Johanna Seibt, and Marco Nørskov. IOS Press, 2018. 133–146.

Simon, Herbert A. *Sciences of the Artificial*. 3rd. ed, The MIT Press.

Simondon, Gilbert. *On the Mode of Existence of Technical Objects*. Trans. Cecile Malaspina and John Rogove, University of Minnesota Press, 2017.

Steadman, Philip. *Vermeer's Camera, Uncovering the Truth behind the Masterpieces*. Oxford University Press, 2001.

Stephensen, Jan Løhmann. "Artificial Creativity, Anthropocentrism and Post-Creativity – The Political Stakes." *Artificial Creativity* conference, 19-20 November 2020, Malmö University, Malmö, Sweden.

Still, Arthur and Mark d'Inverno."Can Machines Be Artists? A Deweyan Response in Theory and Practice." *Arts*, 8.36 (2019): 1-13. https://doi.org/10.3390/arts8010036

Stock Matthew. "The New Picasso? Meet Ai-Da the Robot Artist." *Reuters*.11 Feb. 2019. https://www.reuters.com/article/us-tech-robot-art-idUSKCN1Q0001

Suchman, Lucy. "Feminist STS and the Sciences of the Artificial." *The Handbook of Science and Technology Studies*, 3rd. ed. Eds. Edward J. Hackett, Olga Amsterdamska, Michael Lynch, and Judy Wajcman. The MIT Press, 2008. 139-163.

Youngs, Amy M. Embracing Interdependencies: Machines, Humans, and Non-humans. *Robots and Art: Exploring an Unlikely Simbiosis*. Ed. Damith Herath et al., Springer, 2016. 89-111.

van Dijck, Jose and David Nieborg. "Wikinomics and its Discontents: A Critical Analysis of Web 2.0 Business Manifestos." *New Media and Society* 11.5 (2009): 855–874. https://doi.org/10.1177/1461444809105356

Wachter-Boettcher, Sara. *Technically Wrong: Sexist Apps, Biased Algorithms, and Other Threats of Toxic Tech*. W.W. Norton & Company, 2017.

Weinbaum, David and Viktoras Veitas. "Open-Ended Intelligence: The Individuation of Intelligent Agents," *Journal of Experimental & Theoretical Artificial Intelligence*, 2016. 1–26.

Zylinska, Joana. *Nonhuman photography*. The MIT Press, 2017.

---. *Ai Art: Machine Visions and Warped Dreams*. Open Humanities Press, 2020.