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*Creativity in the Light of AI*

Edited by  
Fabio Fossa, Caterina Moruzzi, Mario Verdicchio

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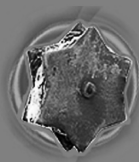
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# AI's Role in Creative Processes: A Functionalist Approach

Leonardo Arriagada, Gabriela Arriagada-Bruneau

## Abstract

From 1950 onwards, the study of creativity has not stopped. Today, AI has revitalised debates on the subject. That is especially controversial in the artworld, as the 21st century already features AI-generated artworks. Without discussing issues about AI agency, this article argues for AI's creativity. For this, we first present a new functionalist understanding of Margaret Boden's definition of creativity. This is followed by an analysis of empirical evidence on anthropocentric barriers in the perception of AI's creative capabilities, which is later criticised for considering insights from media theory. Finally, benefits derived from including AI as an artistic creative producer and supportive tool are discussed. It is then argued that AI can contribute to democratising the artworld. Therefore its creative role must be recognised.

## 1. Introduction

This Special Issue on Creativity in the Light of AI calls us to defend a functionalist approach to understanding creativity, integrating AI as a new and unique stimulus for artistic creation. Considering that most definitions for creativity come from and are for humans, we question what would be an appropriate way to evaluate the role that AI plays in the process of artistic creations. Therefore, we avoid asking if AI will replace or surpass human creativity, which seems to be an ontologically unfounded comparison (at least up to date). Instead, we define the role of AI as a creative stimulus for human artists, different from other non-creative agents. In a nutshell, AI-generated art moves from computer-aid art (CA-art) towards computer-generated art (CG-art).<sup>1</sup> For example, a human artist who previously edited images with software such as Photoshop can now generate images through artificial neural networks (ANNs). Here we highlight the use of ANNs with an unprecedented level of autonomy not seen before in physical tools (brushes, canvases) or virtual tools (image editing software). Furthermore, the characteristic malleability AI provides gives more control over the creative stimulus's scope, timing,

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<sup>1</sup> As Boden - Edmonds (2011) point out, CA-art differs from CG-art. In the first case, the human artist is assisted by a computer to produce an artwork. However, this assistance is not essential. Think, for example, of computer-assisted colouring versus hand-colouring. In contrast, in CG-art, the artwork is an output impossible to achieve without using a computer (in a broad sense), and where the role of the human artist is as minimal as possible. For example, think of an artificially generated image after training an AI with hundreds of examples and let it learn through trial and error.

and nature.

To get some context on creativity research, we will start by providing an overview of some prominent definitions and ideas on the topic. Then, the different positions for and against AI artistic creativity will be summarised. Next, following Margaret Boden's definition of creativity, our particular functionalist approach to this subject will be presented. In doing so, we will rely on two pillars: (a) a new functionalist understanding of Margaret Boden's definition of creativity and (b) empirical evidence, anthropocentric barriers and insights from media theory.

## 2. About Creativity

The notion of creativity can indeed cover a wide spectrum of meanings and definitions. It can be described as a subjective property of the artist or as a quality that is assigned to the process or product in question by the audience. On the other hand, it can also be described as an objective property that can be developed through exercise and hard work.<sup>2</sup>

People's generalised perception of creativity often involves the idea of inspiration, a mysterious muse that comes to the creator's aid, an insightful burst of imagination. This, to some extent, seems

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<sup>2</sup> Moruzzi (2020a) p. 89; see Simon (1985).

to correlate with the role of the unconscious in the human creative process, but “its process is not mysterious; creativity involves standard cognitive processes and structures.”<sup>3</sup> Accordingly, most scholars loosely conceive creativity as the ability to produce something novel and valuable. It can be defined through the lens of its many applications, including scientific novelty, conceptual theory, and art.

The first wave of research on creativity can be traced to the 1950s. Its beginnings are attributed to Guilford’s influential presidential address at the APA,<sup>4</sup> which treated the phenomenon of creativity as a scientific occurrence, with many researchers contrasting it with intelligence measures.<sup>5</sup> Psychologists, whilst studying the personalities of “exceptional creators,”<sup>6</sup> identified that creativity had specific requirements including dedication, perseverance, knowledge of previous works, and their personality traits associated with creativity proficiency.<sup>7</sup>

The second wave came twenty years later, in the 1970s. Cognitive psychologists examined representational structures and mental operations occurring during creative processes. That produced a generalised notion of creativity measured as

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3 Sawyer (2011), p. 107.

4 American Psychological Association; Guilford (1950).

5 As Barron - Harrington (1981) points out, creativity investigators use the term “intelligence” to refer to: 1) Which IQ test measures; 2) The multifactorial domain of cognitive abilities; 3) That which qualified observers as teachers or peers describe as it after repeated observations of behaviour.

6 Sawyer (2011), p. 4.

7 MacKinnon (1966).

a product or outcome: “creative work is a novel work that is accepted as tenable or useful or satisfying by a group.”<sup>8</sup> This is also prevalent in the ‘standardised’ notion,<sup>9</sup> which focuses on conscious hard work, and it has two fundamental requirements for creativity: originality and effectiveness.<sup>10</sup> Nonetheless, many of these ‘traditional’ definitions of creativity are now considered static. They focus on “establishing the criteria that are required to realize and recognize positive instances of creativity. In this sense, they can be considered to be definitions of static creative achievement.”<sup>11</sup> In opposition, some propose a dynamic approach.

A dynamic definition does not introduce radical changes in contrast to the traditional one. However, its implications emerge in how we *conceive* creativity, which implies, according to Corazza, a dynamic phenomenon in its entirety. *Creativity* is seen as an act of dynamic interplays that include the artist, the environment, and society. This embraces artistic creation as the result of many variables interplaying.<sup>12</sup> Therefore defenders of a dynamic approach consider that more rigid definitions (limited by what is

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8 Stein (1953) p. 311.

9 Runco - Jaeger (2012).

10 Regarding the particularity of artistic creativity, Runco - Jaeger (2012) mention that originality refers to an uncommon or unique creation, but this does not include random processes, often misperceived as original. On the other hand, to say that a creation is *effective* might sound unfitting at first, but it means that the artistic creation is appropriate, i.e., useful and not simply random. Effectiveness, consequently, can take “the form of *value*” (Runco - Jaeger, 2012, p. 92) (emphasis added) by either referencing the creation’s economic value or to the appreciation of its beauty by human observers.

11 Corazza (2016).

12 Walia (2019).



achieved), like the Four-C model<sup>13</sup> of creativity,<sup>14</sup> miss the mark.

Other theories want to explain more broadly what the origins of creativity are. They are part of the third wave of research.<sup>15</sup> Around the 1980s, this view distanced itself from previous individualistic approaches. Instead, it complements them with a sociocultural approach.<sup>16</sup> It broadly argues that the results of creativity cannot be *purely* novel. Thus, to explain what creativity is, we cannot put aside elements of imitation and tradition we find in society (including individual, social, and cultural levels) because they give context and enable conventions influencing creative development.<sup>17</sup> If a product is considered creative, this depends on “judgements of a field of experts using the appropriate standards of the historically conditioned domain of activity.”<sup>18</sup>

Also, a Darwinian approach states that creative processes function through two stages: generation of ideas (blind stage) and selection of ideas (the best idea is chosen). That scheme shares Darwin's evolutionary non-teleological theory: the importance lies in the variation of the process itself<sup>19</sup> in particular, how can we account for creative thought? Campbell

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13 According to Kaufman - Beghetto (2009), in this model, four dimensions of creativity are considered: 1) little-c: creativity found in the majority of people; 2) Big-C: creativity found only in great masters or thinkers; 3) mini-c: creativity inherent in the learning process; 4) Pro-c: corresponds to a progression from little-c to professional level expertise creativity.

14 Kaufman - Beghetto (2009).

15 Sawyer (2011).

16 Amabile (1983).

17 Sawyer (2011).

18 Gaut (2010).

19 Campbell (1960).

posits 2 major conditions: mechanisms which produce wide and frequent variation (an inductive, trial and error, fluency of ideas. For supporters of this view, an original (novel) idea is, after all, “one with a low a priori probability, which suggests that such ideas must mostly emerge from blind-variation process.”<sup>20</sup> Thus, creativity is developed as “an evolutionary spandrel,”<sup>21</sup> promoting group bonding. This connects to the ‘cultural evolution’ concept, in which we create (enact creativity) to enrich cultural lineages.

Overall, some consensus exists about what creativity is. Researchers often agree that it is not a question of luck. However, some are more specific and claim that it cannot be simply a mechanical process that produces something original by looking at all possible combinations available. Furthermore, it does not demonstrate understanding or proper skills.<sup>22</sup> Others go even further by alleging that creative actions must have a relevant purpose, a degree of understanding and judgement, and an ability to evaluate the performed task. This is what Gaut calls flair. Hence, creative acting means flair acting.<sup>23</sup>

Now, moving on to the particularity of artistic creativity, the development of AI is currently giving rise to exciting debates about computational creativity. Today, many human artists incorporate AI to produce artworks. For example, the art-collective

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<sup>20</sup> Simonton (1999).

<sup>21</sup> Gabora - Kaufman (2019).

<sup>22</sup> Novitz (1999).

<sup>23</sup> Gaut (2010).

Obviously trained an AI to generate the famous portrait painting *Edmond de Belamy*, auctioned at Christie's.<sup>24</sup> Anna Ridler took numerous polaroid photos of tulips to build a dataset that an AI used to make artificial tulips in the installation *Mosaic Virus*.<sup>25</sup> In Holly Herndon's avant-garde LP *PROTO*, an AI called Spawn sings.<sup>26</sup> All of these cases are the product of Generative Adversarial Networks (GANs). These AI algorithms can deliver results indistinguishable from human-made art, being perceived as aesthetically pleasing by many people.<sup>27</sup> This scenario motivates us to explore the creative contribution of AI. However, we avoid discussing the possibilities for AI-creativity to be considered an *actual* artistic agent. Instead, we examine the functionality of AI contributing to enriching the human creative space.<sup>28</sup>

Given the capabilities that AI systems nowadays have, scholars have put forward different views. These approaches can be grouped as (a) supporting or extending our notion of artistic creativity beyond humans or (b) limiting artistic creativity to inherent human traits such as personality or intention. In the following table, we summarise some of these views to contrast and reference their positions.

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24 Epstein *et al.* (2020); Miller (2019); Still - d'Inverno (2019).

25 Google Arts & Culture (2019); Ridler (2021).

26 Hsu (2019).

27 Cetinic and She (2021).

28 We do not discard the possibility of creativity to be expanded beyond humans.

On the contrary, we are sympathetic to developing notions of AI-creativity that oppose anthropocentric views and any future research exploring the possibility of artificial creative agents. Such a task requires an in-depth look into the debate on AI agency, which exceeds the scope of this article.

The possibility of AIs having artistic creativity	
In favour	Against
AICAN's work should be considered art (Mazzone & Elgammal, 2019)	AIs cannot be artists, creativity is for humans (Kelly, 2019)
The GAN's inventor Ian Goodfellow asserts that "machines are already creative" (Miller, 2019)	Computers cannot be credited as artists until they have some kind of personhood (Hertzmann, 2020)
Machines can be truly creative, while we are doomed only to build on what others have done, AI may ultimately liberate us - Artist Mario Klingemann (Miller, 2020)	Although some AI programs appear creative, to call these programmed acts creative in our terms is to misunderstand the use of this word in language (Erden, 2010)
The application of generative adversarial networks to music generators provides the software with a level of autonomy sufficient to deem it able to create musical works (Moruzzi, 2020a)	Google's computer technique Deep dreaming (DD) cannot be considered a new form of collage. It lacks connections with mixed media and is blind to cultural interlock (Boden, 2017)
Algorithms can be considered creative by human standards, but this entails a new mode of imagination that is co-shaped and co-shared by humans and algorithms (Wellner, 2021)	Programmers of the software and the person who trained it can be considered authors. In general, the artwork and the public do not accept the AI as the author (McCormack et al., 2019)

Table 1: The possibility of AI having artistic creativity (Boden, 2017; Elgammal et al., 2017; Erden, 2010; Hertzmann, 2020; Kelly, 2019; McCormack et al., 2019; Miller, 2019, 2020; Moruzzi, 2020a)

Most critiques against AI-artistic creativity argue that algorithms lack some human characteristics—personhood, cultural interlock, authorship—therefore, they cannot be *actual* creative agents. In contrast, arguments favouring AI-artistic creativity often posit that AI ‘appears’ to be creating art. Therefore it ‘should’ be considered creative. That is, if an AI functions as creative, then it is creative. This article strives to strengthen this functionalist view, based on two pillars: (a) a new functionalist understanding of Margaret Boden’s definition of creativity and (b) empirical evidence, anthropocentric barriers and insights from media theory.

### 3. A New Functionalist Approach to Margaret Boden's Definition of Creativity

This article proposes a new functionalist view of Margaret Boden's definition of creativity, one of the broadest and most widely used cognitive science to AI research. However, before setting out this new vision, it is worth briefly outlining Boden's theory in this regard. For her, creativity is the ability to develop ideas or artefacts that are "*new, surprising, and valuable.*"<sup>29</sup> Next, let us look at these three components and relate them to the discussion on AI-creativity. We anticipate that our functionalist perspective will make use of that last characteristic, "value". In particular, we will see that value is associated with being perceived as art or functioning as art in artistic creations.

#### 3.1 *Novelty*

The *novelty* aspect has two different meanings. Boden says some ideas or artefacts are psychologically creative (P-creative), and others are historically creative (H-creative). The former indicates creations that an individual has personally made, regardless of whether they have appeared beforehand. The latter is a subtype of the former and corresponds to ideas or artefacts created for the first time in human history.<sup>30</sup>

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<sup>29</sup> Boden (2011), p. 29.

<sup>30</sup> For example, the first time a child uses a crayon to draw on the walls of his

Consequently, the above allows us to distinguish between P-novelty and H-novelty. If we think about AI-creativity, we notice that the most interesting cases will be those of H-novelty. For example, when an AI proves a mathematical theorem that no human mathematician could prove before.

### 3.2 *Surprise*

The *surprise* aspect is central to Boden's definition. It has three different meanings, allowing us to distinguish three types of creativity. The first is combinational creativity, which "involves making unfamiliar combinations of familiar ideas"<sup>31</sup> deliberately or unconsciously. For example, a programmer comparing an AI algorithm with the neurons of our brains. Thus, this first type of *surprise* arises from unlikely combinations. At first glance, it would seem that a computer should have no problem having two sets of concepts and combining them to create a new idea. However, we can expect these combinations to be generally not valuable. Hence, combinational creativity does not seem to be the best field for AI.

Exploratory and transformational creativity, on the other hand, requires the definition of conceptual space, which for Boden is a structured style of

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house, he is being P-creative. Nevertheless, if that child is indeed the first human being in history to draw on a wall (presumably in a cave), he is also H-creative.

<sup>31</sup> Boden (2011), p. 3.

thinking. Consider, for example, artistic styles such as Neoplasticism or Impressionism. In these cases, an artwork must follow specific rules to belong to a style. These rules are relatively feasible to write in algorithmic language so that a computer can know them.

In exploratory creativity, conceptual space limits the outcomes. We can create any idea or artefact but always following the rules of style. In this second meaning of *surprise*, we are amazed to find products that fit in a conceptual space, which we had not realised before. Regarding AI-creativity, if these spaces are defined algorithmically, we can use a computer to explore new possibilities for ideas or artefacts. Thus, we can see that exploratory creativity is a much more fertile field for studying computer art. Machines might even help us define a conceptual space. Take the case of Frank Lloyd Wright's architectural work. A computational analysis of his work could give us clues to describe his style algorithmically and enable us to continue building in his particular way.<sup>32</sup>

For its part, transformational creativity implies knowing the limits of conceptual space and overcoming them. This third meaning of *surprise* relates to the idea of an *impossibilist surprise*. In simpler words, it refers to the most profound cases of creativity and involves someone engaging with "something which, [...] to the conceptual spaces in their minds, they couldn't have thought [of] before."<sup>33</sup> It builds a new space for unattainable thoughts before

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<sup>32</sup> See Boden (2004).

<sup>33</sup> Boden (2004) p. 6.

the existence of this newly transformed space. Regarding AI-creativity, we can ask an algorithm to deviate from known styles. So it also appears as a tangible possibility for studying computational art.

### 3.3 Value

An algorithmic creation can be new and surprising by simple combinatorics. Value, on the other hand, is the most challenging point to achieve. Catherina Moruzzi<sup>34</sup> stresses that the “valuable” attribute makes Boden’s creativity *subject-dependent*. Therefore, Moruzzi considers determining whether the outcome is creative by testing the audience’s intuitions about it. This audience refers to people, so we can note that creativity, although it may be human or artificial, is always judged by human receptors.

Regarding the value of AI-artistic creativity, viewing what is conceived as artwork in art theory is essential. In this respect, George Dickie defends that an artwork, “*in the descriptive sense is (1) an artifact (2) upon which some society or some sub-group of a society has conferred the status of candidate for appreciation.*”<sup>35</sup> It can be noted that the second part points precisely to society’s valuation of this product. The latter is crucial because it shows us that the status of art is *subject-dependent*, in the same way as Boden’s creativity. Both definitions (Boden’s creativity and

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<sup>34</sup> See Moruzzi (2020b).

<sup>35</sup> See Dickie (1969), p. 254.



Dickie's artwork) are essentially functional due to the need for external recognition by the human audience. For example, if CG-art looks creative to people, it must by definition be considered creative.

Taking into account the above, Boden's creativity is not the most precise definition, but we argue that its functionality has made it worthwhile inside and outside Cognitive Science. Thus, since creativity is an ability, anyone or anything which possesses that ability will be creative. Many refer to creativity as a predominantly human skill. However, recent research has documented cases of creativity observed in chimpanzees, elephants, crows and other animals.<sup>36</sup> This suggests that different kinds of agents perform various types of creativity according to their origin. Thus, human creativity will be of the human type, the creativity of nature will be of the natural type, and the creativity of machines or algorithms will be of the artificial type. Examples of this creativity are a painting by van Gogh, the geographical marvel Towers of Paine, and the Go move with which the AI AlphaGo defeated Lee Seedol.<sup>37</sup> In short, the breadth of Boden's definition allows us to include all cases of creativity, whether human or non-human.

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<sup>36</sup> See Moruzzi (2021).

<sup>37</sup> Kohs (2017).

#### 4. Empirical Evidence, Anthropocentric Barriers and Insights From Media Theory

In computational creativity, the weighting of its value is a variation of the Turing test.<sup>38</sup> For example, if we want to evaluate the creativity of CG-art, the test would show the audience such artworks without telling them their artificial origin. Then, the algorithm that produced them is considered creative<sup>39</sup> if people find them aesthetically new, surprising, and valuable. This functional approach allows us to think about creativity without appealing to concepts such as intelligence, intentionality, or mystical inspiration. Instead, an agent is considered creative if he/she/it produces something new, surprising, and valuable to the human audience. Next, we take a look at the empirical evidence of AI-artworks perceived as creative. This exercise will serve as empirical evidence to our functionalist approach to AI-creativity.

The first study we consider here used two focus groups, one for paintings made by AI and another for paintings made by humans. It intended to capture different views on the concept of art for diverse individuals and their relation to AI.<sup>40</sup> The findings show that most people make a crucial *a-priori* distinction between ‘human-generated art’ and ‘AI-generated art’, pointing out that the latter is not

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38 See Wellner (2021).

39 Creative as a generator of new, surprising, and valuable products. We are not predicating the capacity of *being creative per se*, not as an inherent property of the algorithm.

40 See Hong (2018).

'original' and is 'less valuable'. According to Hong, some individuals even claim that AI cannot achieve a creative performance on the same level as humans. Moreover, the most common reason to justify these negative perceptions resides in AI lack of autonomy, rendering them unable to be creative. This refers to how AI relies on humans (i.e., programmers) to enable any creative process. The above is mirrored in the assumption that AI art is just "an extension of whoever created the AI,"<sup>41</sup> therefore diminishing the quality or doubting the authenticity of AI-artistic creativity.

In contrast to cases where individuals are aware of the artwork's authorship (human or AI), studies show that AI ranks higher in *likeness* (which piece is more liked) when not knowing *a priori* who is the author. For example, a study working with CANs (Creative Adversarial Networks) shows that "human subjects rated the images generated by the proposed system higher than those created by real artists, [...] subjects not only thought these artifacts were created by artists, but also rated them higher on some scales than human art."<sup>42</sup>

The above is closely related to the portrayal of AI having 'human-like' capacities, unconsciously creating a 'derived human-like status'. This results in conflictive biases against their potential contribution to artistic creation as a whole. In simple words, a bias makes humans think 'machines cannot be the same as us'. Therefore, they cannot be *as* creative or *as* capable.

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41 Hong (2018) p. 299.

42 Elgammal *et al.* (2017) pp. 18–22.

That is particularly relevant for artistic creativity, often sensed as a highly emotional experience. If we go back to Hong's study, the perception is that even if an AI can have feelings, "its feeling would not be as delicate as a human's emotion."<sup>43</sup> Thus, the indicated has built a barrier between the embraced side of AI as part of our socio-technical development and that other side that *should* remain human, which for many includes creativity: "a final wall that AI cannot breach."<sup>44</sup>

Colton noted that such adversity is due to a lack of accurate knowledge of how AI systems work, hence to *prove* the creative capacities of different computational systems, further understanding of how they can achieve it is called for. While this does not mean that AIs have the same creative capabilities that humans do, but it opens the space to argue that they can be considered as more limited but equally valuable agents for artistic creation:

When computers are used [...] it is commonplace for people to attribute creativity to the programmer in addition (or instead of) the software. This could be seen as a double standard, as creativity wouldn't ordinarily be attributed to the teacher of a student who produced an artwork, but because the training of software is far more explicit than that of an art student, it is understandable.<sup>45</sup>

A first step to integrating AI into artistic creation

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43 Hong (2018) p. 299.

44 Hong (2018), p. 291.

45 Colton (2008) p. 5.

might be to turn away from a contrasting definition of their capacities and expectations. Understandably, perhaps, humans judge artificial intelligence in contrast to non-artificial or organic human intelligence, where the technology is understood as a tool manipulated to work in our favour. However, these antagonistic prejudices overlook potential avenues of integration that can enrich and enhance what it means to *create* art.

We enthusiastically incorporate technology into our lives, yet we deny its autonomy. Marshall McLuhan's<sup>46</sup> media theory understood technology as an extension of the human being until the 20th century. Nevertheless, as philosopher Mercedes Bunz points out, in the 21st century, a new understanding of the human being as an extension of technology arises. These approaches are complementary: "In these crossovers [...] the relationship between humans and technology is constantly renegotiated."<sup>47</sup> Where the subject ends and the tool begins are questions that point to a boundary. So exploring new ways of understanding longstanding notions like creativity is called for.

The upcoming section explains what it means to take a functionalist stance on AI- artistic creativity.

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46 See McLuhan (1994).

47 Bunz (2007) p. 79.

## 5. AI-Artistic Creativity: A Functional Approach

We have proposed that AI-artistic creativity involves producing an artefact that is new, surprising and aesthetically valuable for their AI creator and the human audience. From this, it can be noted that AI-artistic creativity takes a functional approach, in which if the requirements are met, the ability exists. This has the advantage of avoiding issues such as (incorrectly) conferring intentionality or free will to an algorithm. In this sense, AI-creativity has an aesthetic character that ultimately rests on how well the human audience evaluates its work. Note that this step is not so different from the work of a human artist. Whether an AI or a human artist produces something new, surprising, and, according to them, valuable, their creative ability is in the hands of the public's reception. This way of verifying creative abilities correlates with the functionality proposed by Alan Turing.<sup>48</sup> In this regard, Geoffrey Jefferson mentioned that:

Not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain—that is, not only write it but know that it had written it. No mechanism could feel (and not merely artificially signal, an easy contrivance) pleasure at its successes, grief when its valves

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<sup>48</sup> See Turing (1950).

fuse, be warmed by flattery, be made miserable by its mistakes, be charmed by sex, be angry or depressed when it cannot get what it wants.<sup>49</sup>

Turing responds to this criticism by indicating that a human being *A* will never know whether a human being *B* thinks or has emotions. However, *A* agrees to believe that *B* thinks and has emotions if his/her actions appear so. That is, *A* considers *B* to be human if *B* functions as a human. In our case, our definition of artificial artistic creativity does not require us to ensure that an AI has thoughts or emotions. Instead, we agree that this issue is irrelevant if its products are new, surprising, and aesthetically valuable. There is an aesthetic experience *regardless* of the origins of the artwork. Although some may argue that the context and experience of the author are as relevant as the product itself, we consider this to apply to human art. In contrast, the requirements and expectations for AI-generated artwork *should be* different and appreciated on their own accord.

Additionally, we consider it essential to highlight the functional role of AI in artistic creativity because it differs in at least two ways from other creative stimuli or assistance:

First, AI gives the human artist very different support from previous tools. Indeed, the level of autonomy that a tool such as a paintbrush, or guitar, has is nil without the manipulation of the human artist. Simply put, neither the brush nor the guitar can paint or sound on its own. In contrast, the

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49 Jefferson (1949) p. 1110.

assistance a human artist gets from using GANs, the most popular type of ANN today, is virtually autonomous. This is because this type of AI often uses unsupervised learning. Simply put, a human artist who delivers enough examples of paintings or songs to a GAN will get results created by the AI on its own.<sup>50</sup> As indicated previously, AI modified the role of computers in artistic creation, moving from CA-art to CG-art.

Second, note that AI is not the only autonomous stimulus human artists use. Indeed, since the dawn of painting and photography, nature has inspired art. For example, think of a painting of a coastal sunset or a photograph of the Torres del Paine. In the first case, the human painter cannot modify the Sun's force of gravity on Earth. In the latter, nor does the human photographer influence the geological forces that produced the mountains in Patagonia. That is why both, the sunset on the beach and the Torres del Paine, are examples of autonomous creative stimuli. In a broad sense, we can say that they have been produced not by humans but by the mere action of the laws of nature. In short, AI is an autonomous creative stimulus since it delivers outputs not produced by the human artist. Still, it differs from the forces of nature because it can be invoked at will, making it more malleable and adaptable to different aims. Therefore, whenever the human artist uses AI for creative purposes, it can play a unique role in influencing the artistic process.

Here we have defended the idea that there is

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<sup>50</sup> See Arriagada (2020).



room to accept a notion of creativity that fits the capabilities and uses given to the AI in the process of artistic creation. The upcoming section briefly explains the social and ethical aspects that benefit from this functional view.

## 6. AIs Democratization of Creative Processes

As noted by Schröter, the meaning of creativity is historically contingent and malleable.<sup>51</sup> Despite the fact machine-created artwork can seem ahistorical and absurd now, in Schröter's words, this could be the start of a new way of producing and perceiving art. Most of the statements against AI creativity seem to refer to ideas of autonomy, knowledge, and intentionality. This overlooks the fact that most humans *need* to be taught about art, how to appreciate it, produce it, and understand it. In this regard, AIs can contribute to finding new paths of interpretation of previous work and developing pathways to new techniques or styles.

Considering this, AIs offer an opportunity to diversify creative processes and combat the elitist sphere of artistic scenes (including those who create and appreciate the creations) by expanding access to digital artwork and giving way to divergent social contexts influencing democratic processes and stimulating new creative paradigms. This allows

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<sup>51</sup> See Schröter (2019).

for different experiences not tied to material and physical phenomenologies to feed the artist's creative processes and increase his artistic capabilities.

This democratisation, we argue, is understood as a rupture of an artworld with a dominant hierarchical view. It is a break from demanding previous knowledge about art theory and ingrained respect for institutions such as museums, galleries, and curatorship. AIs do not follow that vertical structure. Instead, they connect with their audience horizontally. This means no expectation or cultural pressure from this new genre, with no specific references, eliminating style barriers or techniques that originated a tradition. It allows us to access an expanded artistic experience by transcending ideas and genres, unifying creations through patterns inaccessible to human-brain capacities. AI-generated art is inorganic but aesthetically appealing. It is not here to displace human-generated art but rather as a new genre that provides a different experience and should be understood and respected within its own context.

We suggest a parallel with Sen's 'capabilities approach',<sup>52</sup> where equality is measured against a person's capabilities, that is, the activities within reach, including ways of being and doing.<sup>53</sup> We argue that a functionalist notion of creativity extends people's capabilities, providing new creative knowledge and artistic tools. Thus, technologies like AI are not to be understood in isolation, but rather

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<sup>52</sup> See Sen (1974), (1980).

<sup>53</sup> Sen (2000).

through their properties and causal power achieved by the significant relations they can establish.<sup>54</sup> We contest that depriving humans of those possibilities, by not recognising them as artistically valuable, can be considered unfair to their development and artistic flourishing.

## 7. Conclusions

In this investigation, a broad overview of prevalent creativity notions in the literature, including views for and against AI creative capabilities claims, have been presented. In this regard, it was noted that some researchers tried to extend the notion of artistic creativity beyond humans. In contrast, others think that we should limit it to inherently human traits, such as intention. However, we have decided to consider a more pragmatic reason we should accept the creative value AI offers. In particular, this article proposes that AI creativity should be understood under a functional account, implying that it is creative if it functions as creative. Thus, based on Boden's notion of creativity, we establish that art creation involves producing an artefact that is new, surprising, and aesthetically valuable to its creator and society.

Considering the above, AI can contribute directly to art creation by autonomously providing products and inspiring and supporting human

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<sup>54</sup> See Lawson (2010).

artists' processes. In addition, to problematise anthropocentric barriers to AI creativity, empirical evidence was discussed. From those studies, we are sympathetic to views promoting the renegotiation of the limits humans have with technologies, embracing technologies as extensions of humanity and vice versa.

Additionally, we have defended that recognising AIs creative value democratises the artistic field in its various dimensions. This relates to the extended accessibility these new technologies can provide and the decontextualisation of the artist itself. In short, it is no longer a requirement to belong or approach the artistic scene and art history through traditional channels. Instead, nowadays, we are experiencing a new phase in artistic creation thanks to the implementation and integration of disruptive technologies. Our call is to embrace it. For this, we need to recognise the creative value AIs can offer and promote open source code and inclusive practices that can stimulate this artistic revolution.

## References

- Amabile, T. M. (1983): "The Case for a Social Psychology of Creativity" in T. M. Amabile (Ed.), *The Social Psychology of Creativity* (pp. 3–15). New York: Springer, pp. 3–15, [https://doi.org/10.1007/978-1-4612-5533-8\\_1](https://doi.org/10.1007/978-1-4612-5533-8_1).
- Arriagada, L. (2020): *CG-Art: Demystifying the anthropocentric bias of artistic creativity*, «Connection Science», vol. 32,

issue 4, pp. 398–405, <https://doi.org/10.1080/09540091.2020.1741514>.

Barron, F., - Harrington, D. M. (1981): *Creativity, Intelligence, and Personality*, «Annual Review of Psychology», vol. 32, issue 1, pp. 439–476, <https://doi.org/10.1146/annurev.ps.32.020181.002255>.

Boden, M. (2017): Is deep dreaming the new collage?, «Connection Science», vol. 29, issue 4, pp. 268–275, <https://doi.org/10.1080/09540091.2017.1345855>.

Boden, M. (2011): *Creativity and art: Three roads to surprise*, Oxford: Oxford University Press.

Boden, M. (2004): *The Creative Mind: Myths and Mechanisms*, London: Routledge, <https://doi.org/10.4324/9780203508527>.

Bunz, M. (2007). *La utopía de la copia: El pop como irritación* (trans. by C. Pavón), Buenos Aires: Interzona.

Campbell, D. T. (1960): *Blind variation and selective retentions in creative thought as in other knowledge processes*, «Psychological Review», vol 67, issue 6, pp. 380–400, <https://doi.org/10.1037/h0040373>.

Cetinic, E., - She, J. (2021): *Understanding and Creating Art with AI: Review and Outlook*, ArXiv:2102.09109 [Cs], <http://arxiv.org/abs/2102.09109>.

Colton, S. (2008): “Creativity Versus the Perception of Creativity in Computational Systems” in *AAAI Spring Symposium—Technical Report*, p. 20.

Corazza, G. E. (2016): *Potential Originality and Effectiveness: The Dynamic Definition of Creativity*, «Creativity Research Journal», vol. 28, issue 3, pp. 258–267, <https://doi.org/10.1080/10400419.2016.1195627>.

- Dickie, G. (1969): *Defining Art*, «American Philosophical Quarterly», vol. 6, issue 3, pp. 253–256.
- Elgammal, A. - Liu B. - Elhoseiny M., - Mazzone M. (2017): *CAN: Creative Adversarial Networks, Generating Art' by Learning About Styles and Deviating from Style Norms*, ArXiv:1706.07068 [Cs], <http://arxiv.org/abs/1706.07068>.
- Epstein, Z. - Levine, S. - Rand, D. G. - Rahwan, I. (2020): *Who Gets Credit for AI-Generated Art?*, «IScience», 23(9), <https://doi.org/10.1016/j.isci.2020.101515>
- Erden, Y. J. (2010): *Could a Created Being Ever be Creative? Some Philosophical Remarks on Creativity and AI Development*, «Minds and Machines», vol. 20, issue 3, pp. 349–362, <https://doi.org/10.1007/s11023-010-9202-2>.
- Gabora, L., - Kaufman, S. B. (2019): *Evolutionary Approaches to Creativity*, ArXiv:1106.3386 [q-Bio], <http://arxiv.org/abs/1106.3386>.
- Gaut, B. (2010): *The Philosophy of Creativity*, «Philosophy Compass», vol. 5, issue 12, pp. 1034–1046, <https://doi.org/10.1111/j.1747-9991.2010.00351.x>.
- Google Arts & Culture. (2019): *Anna Ridler: Can datasets create art?* - Barbican Centre. Google Arts & Culture, <https://artsandculture.google.com/exhibit/anna-ridler-can-datasets-create-art-barbican-centre/iALi0lnI1pkrLg>.
- Guilford, J. P. (1950): *Creativity*, «American Psychologist», vol. 5, issue 9, pp. 444–454, <https://doi.org/10.1037/h0063487>.
- Hertzmann, A. (2020): *Computers do not make art, people do*, «Communications of the ACM», vol. 63, issue 5, pp. 45–48, <https://doi.org/10.1145/3347092>.

- Hong, J.-W. (2018): "Bias in Perception of Art Produced by Artificial Intelligence" in M. Kurosu (Ed.), *Human-Computer Interaction. Interaction in Context*, New York: Springer, pp. 290–303, [https://doi.org/10.1007/978-3-319-91244-8\\_24](https://doi.org/10.1007/978-3-319-91244-8_24).
- Hsu, H. (2019), *Machine Yearning*, «The New Yorker», vol. 95, issue 13, pp. 83–84.
- Jefferson, G. (1949): *The Mind of Mechanical Man*, «British Medical Journal», vol. 1, issue 4616, pp. 1105–1110, <https://doi.org/10.1136/bmj.1.4616.1105>.
- Kaufman, J. C. - Beghetto, R. A. (2009): *Beyond Big and Little: The Four C Model of Creativity*, «Review of General Psychology», vol. 13, issue 1, pp. 1–12, <https://doi.org/10.1037/a0013688>.
- Kelly, S. D. (2019): *A philosopher argues that an AI can't be an artist*, «MIT Technology Review», <https://www.technologyreview.com/2019/02/21/239489/a-philosopher-argues-that-an-ai-can-never-be-an-artist/>.
- Kohs, G. (2017): *AlphaGo*, Moxie Pictures, Reel As Dirt.
- Lawson, C. (2010): *Technology and the Extension of Human Capabilities: Technology and the Extension of Human Capabilities*, «Journal for the Theory of Social Behaviour» vol. 40, issue 2, pp. 207–223, <https://doi.org/10.1111/j.1468-5914.2009.00428.x>.
- MacKinnon, D. W. (1966): *What makes a person creative?*, «Theory Into Practice», vol. 5 issue 4, pp. 151–156, <https://doi.org/10.1080/00405846609542017>.
- McCormack - J., Gifford - T., & Hutchings, P. (2019): "Autonomy, Authenticity, Authorship and Intention in Computer Generated Art", in A. Ekárt - A. Liapis - M. L. Castro Pena (Eds.), *Computational Intelligence in Music*,

*Sound, Art and Design*, New York: Springer, pp. 35–50  
[https://doi.org/10.1007/978-3-030-16667-0\\_3](https://doi.org/10.1007/978-3-030-16667-0_3)

McLuhan, M. (1994): *Understanding media: The extensions of man*, Cambridge, MA: MIT Press.

Miller, A. (2019): *The Artist in the Machine: The World of AI-Powered Creativity*, Cambridge, MA: MIT Press.

Miller, A. (2020): *Creativity in the Age of AI: Computers and artificial neural networks are redefining the relationship between art and science*, «American Scientist», vol. 108, issue 4, pp. 244–250.

Moruzzi, C. (2020a): *Artificial Creativity and General Intelligence*, «Journal of Science and Technology of the Arts», vol. 12, issue 3, pp. 84–99, <https://doi.org/10.34632/jsta.2020.9481>.

Moruzzi, C. (2020b), *Learning through creativity: How creativity can help machine learning achieving deeper understanding*, «Rivista Italiana Di Filosofia Del Linguaggio», vol 14, issue 2, <https://doi.org/10.4396/AISB201904>.

Moruzzi, C. (2021): *Measuring creativity: An account of natural and artificial creativity*, «European Journal for Philosophy of Science», vol. 11, issue 1, 20, <https://doi.org/10.1007/s13194-020-00313-w>.

Novitz, D. (1999): *Creativity and constraint*, «Australasian Journal of Philosophy», vol 77, issue 1, pp. 67–82, <https://doi.org/10.1080/00048409912348811>.

Ridler, A. (2021), *Mosaic Virus*, 2019. ANNA RIDLER, <http://annaridler.com/mosaic-virus>.

Runco, M. A. - Jaeger, G. J. (2012): *The Standard Definition of Creativity*, «Creativity Research Journal», vol. 24, issue 1, pp. 92–96, <https://doi.org/10.1080/10400419.2012.6500>



92.

- Sawyer, R. K. (2011): *Explaining creativity: The science of human innovation*, Oxford: Oxford University Press.
- Schröter, J. (2019): *Artificial Intelligence and the Democratization of Art*, <https://doi.org/10.25969/MEDIAREP/13546>.
- Sen, A. (1974): *Informational bases of alternative welfare approaches*, «Journal of Public Economics», vol. 3, issue 4, pp. 387–403, [https://doi.org/10.1016/0047-2727\(74\)90006-1](https://doi.org/10.1016/0047-2727(74)90006-1).
- Sen, A. (1980): *Tanner Lectures on Human Values*, Volume 1. Cambridge: Cambridge University Press.
- Sen, A. (2000): *Development as Freedom*, Oxford: Oxford University Press.
- Simon, H. (1985): “What We Know About the Creative Process”, in R. L. Kuhn (Ed.), *Frontiers in Creative and Innovative Management*, Pensacola: Ballinger Publishing Company.
- Simonton, D. K. (1999): *Target Article: ‘Creativity as Blind Variation and Selective Retention: Is the Creative Process Darwinian?’*, «Psychological Inquiry», vol. 10, issue 3, pp. 309–328, [https://doi.org/10.1207/S15327965PLI1004\\_4](https://doi.org/10.1207/S15327965PLI1004_4).
- Stein, M. I. (1953): *Creativity and Culture*, «The Journal of Psychology», vol. 36, issue 2, pp. 311–322, <https://doi.org/10.1080/00223980.1953.9712897>.
- Still, A. - d’Inverno, M. (2019): *Can Machines Be Artists? A Deweyan Response*, in «Theory and Practice. Arts», vol. 8, issue 1, p. 36, <https://doi.org/10.3390/arts8010036>.
- Turing, A. (1950): *Computing Machinery and Intelligence*.

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«Mind», vol. 59, issue 236, pp. 433–460, <https://doi.org/10.1093/mind/LIX.236.433>.

Walia, C. (2019): *A Dynamic Definition of Creativity*, «Creativity Research Journal», vol. 31, issue 3, pp. 237–247, <https://doi.org/10.1080/10400419.2019.1641787>.

Wellner, G. (2021): *Digital Imagination, Fantasy, AI Art*. «Foundations of Science», <https://doi.org/10.1007/s10699-020-09747-0>.