

# The Creativity of Artificial Intelligence in Art

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New technologies, and especially those that involve artificial intelligence, are dynamically transforming the state of creativeness. Computers are assuming very profound positions in creation: music, science, fine arts, and architecture. However, my research suggests that we should focus on a broader association between computers and creativity. Instead of recognizing the computer as a tool to aid human creators, it could be viewed as a creative embodiment in its own light. This view has borne a new concept of artificial intelligence – computational creativity. When machines began producing artworks, they changed to become creative producers. Artificial intelligence's popularity in artistic creation highlights the new art genre. However, the credibility of this art genre and the aspect of creation are still enigmatic concepts that require intensive academic and practical investigation. Since the standard elaboration of art assesses this notion as a form of communication between individuals, a new investigation that engages AI art requires supplementary strategies to the aspect of artistic work, to define a category of AI art. With this focus, I investigate if machines can illustrate artistic abilities and if this illustrative process is creative in itself. In addition, even if a creative process exists, are its results artistic, and if so, how is it associated with human-centered creativeness?

My research begins by analyzing human intelligence and its constructs, because creativity is conclusive in intelligence, AI-related discussions should be based on the illustration of human-enabled machines, mirrored with human intelligence. I intend to introduce the topic of AI and associated concepts: What is a 'machine' based on computational operations, and 'thinking' based on machines? Under what circumstances can a machine be referred to as intelligent? According to McCarthy<sup>1</sup>, the concept of intelligence is grounded on the computational abilities to meet specific targets. This explanation works for both humans and machines. Alan Turing, considered as one of AI's fathers, postulated the idea that it is challenging to address a conceptual variation between human and machine. By his 'Imitation Game', also called the Turing Test, he assessed the outcome in which a machine took part in a human-related role. Consequently, the Turing Test is essential in the present day's query and navigation of AI as it explores the possibility in which a machine can emulate human abilities. Moreover, the test offers a precise comprehension of the machine and human association.

Next, transiting from 'intelligence' to 'creativity', I dove into various applications and current debates about AI from an artistic perspective. In order to assess the various fields that are applying AI for artistic evolution, I focus on the question of the viability of accomplishing computational creativity via particular computer programs that replicate some constructs of creative artistic actions. The discussed fields augment the recent trends of creativity enhanced by human creativity. One of the examples is the AI artwork, *Portrait of Edmond de Belamy*, generated using an AI-based algorithm that was a product of a trio of French programmers, with the alias, *Obvious*. The artwork was sold for \$432,500 – exceeding its projected value by forty percent. The portrait's system was first assessed with a data set composed of 15,000 paintings placed in the 14th to 20th century. Later, the algorithm designed new images depending on the ruled-in data sets. The algorithm's second part – discriminator – compares the new images with human-painted portraits. The sale of this painting triggered a quiet controversy on whether it was created by a machine or replicated human creativity, also inflated several ethical questions on the art's attribution.

Based on the portrait's question of articulation and originality, I posed three research questions of articulation and originality: To what extent can an artist claim AI art as his own? How does knowing an artist's identity (human or AI) affect the idea that AI can generate an original work of art? How does knowing an artist's identity (human or AI) affect one's evaluation of the artwork? Aiming to seek the answer, I conducted a theoretical analysis of different theories, models, and discussions of AI-generated painting.

To address the questions of artists' identity, I used schema theory to describe how bias can affect one's cognition and, in the process, affect one's perception of identity. Hong and Curran state that a schema is "any active processing data structure that organizes memory and guides perception, performance, and thought"<sup>2</sup>. For instance, art Schemata would include comprehension of the art's concepts, audience perceptions that deem art more or less creative, the artworks we have been interested in or not, the aspects in which we viewed the works, and so on. Moreover, people possess schemata that include assumptions on AI and a specific work's creativity. As schemata could be triggered when someone interprets new information, it is viable to state that schema and stereotype perform

the same as they would in cognitive processes. Therefore, the theory is credible in comprehending how AI-related stereotypes manipulate the audience's perception of AI's input. McCarthy highlights that there are individuals who would question if AI is enabled to perform like humans, even when AI's performance is objectively similar. Also, according to Ali, individuals are due to offer a lower rating on paintings if it is generated by artificial intelligence<sup>3</sup>.

Furthermore, I evaluated Generative Adversarial Networks (GAN) and Creative Adversarial Networks (CAN) as algorithms that have been extensively used to produce AI art. GAN, proposed by Ian Goodfellow, is a completely new approach of predicting generative models using adversarial pathways, which combinedly train two distinct models: first, the generative model (G) takes data distribution, while the second, discriminative model predicts the likelihood that a data sample emanated from a trained set instead of G. While most of its outcomes are captivating, it is rather perceived as a novel illustration of the power that neural networks can utilize in art creation. Many applications implementing GAN have erupted, enabled artists to repaint a picture based on a style that is consistent with one's favorite artist. In addition, the advanced new models are constructed by an artist to "understand" the aesthetics by viewing different images via machine learning software. This algorithm later develops other images that adhere to the learned aesthetics. Although these machines are quite amazing at performing what they are instructed, creativity is a different construct, and training them towards that direction is machine learning's nightmare.

However, recent studies have introduced the concept of CANs, which are generated from GANs but with an extra component that enables its generator to function "creatively." This approach created art by viewing art and understanding its style, then it becomes "creative" by augmenting the activation potential of the generated work by straying from that style. Besides, they proposed that since GANs are unable to produce creative work, an improvement on their objective entity enables the production of quite "creative" designs by augmenting deviations from the listed styles and reducing deviations from design distribution. The authors found that human respondents could not differentiate paintings produced by CAN from those generated by humans. Although art generated by either GAN or CAN lacks the emotional intent found in humans, these artistic AI systems are already producing art in an extraordinary form. Hence, it is viable to regard creativity based on recent AI technologies. Even if these technologies are yet to match human creativity, it would be logical to imply that they have some capability to function in a creative form.

Acknowledged as a novel value expressed by human intelligence, creativity was evaluated as one of AI's critical focuses. In order to explore the correlation between human and machine creativity, I analyzed and compared different scholars' definitions of creativity. In his book on creativity, Sawyer states that AI still cannot master everyday creative skills<sup>4</sup>. However, Boden argues against the idea that creativity is incomprehensible in computational intelligence, and she highlighted three forms of creativity that can be addressed to indicate the value of AI art: combinatorial, transformational, and explanatory creativity<sup>5</sup>. Through Elgammal's Portraits, I found that AI art qualifies to be artistically creative because they demonstrate combinatoric creativity. On the other hand, the AARON program illustrated how machine learning can be engaged to augment AI's creativity by producing arts via explanatory creativeness.

In conclusion, although AI art is often critiqued on the basis of creativity, my study established that AI has the ability to produce artistic creativity from the previous discussion. I suggest that people who are committed to AI art are in the right place because by doing so, they have an opportunity to explore new AI technologies, discover the potential of a human's psychological process of creating art, and do the art. Therefore, instead of focusing on the mechanical augmentation of algorithms, artists need to explore other possibilities to control their images where AI programs function to define new forms of creative output.

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<sup>1</sup> McCarthy, John. "What is Artificial Intelligence? How Does AI Work?" *Tech News, Trends & Professional Development Resources* | Built In. Last modified 2007. <https://builtin.com/artificial-intelligence>.

<sup>2</sup> Hong, Joo-Wha, and Nathaniel M. Curran. "Artificial Intelligence, Artists, and Art: Attitudes Toward Artwork Produced by Humans vs. Artificial Intelligence." *ACM Transactions on Multimedia Computing, Communications, and Applications* 15, no. 2s (2019), 58(2-18). Accessed September 29, 2020. doi:10.1145/3326337.

<sup>3</sup> Ali, Mohammed. "The Human Intelligence vs. Artificial Intelligence: Issues and Challenges in Computer Assisted Language Learning." *International Journal of English Linguistics* 8, no. 5 (2020), 259. doi:10.5539/ijel.v8n5p259.

<sup>4</sup> Sawyer, Robert K. *Explaining Creativity: The Science of Human Innovation*. New York: OUP USA, 2014.

<sup>5</sup> Boden, Margaret A. *Creative Mind: Myths and Mechanisms*. London: Psychology Press, 2004.