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## Original Research Article

# Reviewing the Role of Artificial Intelligence in Creating Original Works of Art Case Study: Harold Cohen's Paintings\*

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## Abstract

**Problem statement:** The increasing use of artificial intelligence in the field of visual arts has led to the creation of innovative and diverse works of art. However, despite the widespread interest of artists in using this technology, its place and importance in creating an artwork has not been carefully evaluated. Among the central questions in this regard is the role of artificial intelligence in the formation of original works of art.

**Research objective:** The purpose of this research is to investigate the role and importance of artificial intelligence in creating original works of art. For this purpose, the works of Harold Cohen, who is one of the pioneers of using artificial intelligence in the art of painting, will be evaluated. Therefore, in the first part, the concept of artificial intelligence is briefly stated. Then the Chinese room thought experiment, which is one of the most prominent tests related to artificial intelligence, will be used as a tool to check the performance of the machine "AARON", created by Harold Cohen. In this test, "creativity", "awareness" and "experience" will be evaluated as the main components of producing original works of art. In the following, problems related to the role of the mentioned components in the performance of AARON will be listed. Finally, an attempt is made to present a new formulation of these fundamental concepts, despite the flaws in the works produced by AARON, it has an undeniable role in the creation of the artwork.

**Research method:** In order to evaluate AARON's performance in the formation of the artwork, this research considers John Searle's approach and his Chinese room argument.

**Conclusion:** Artificial intelligence plays an important and undeniable role in the production of original, innovative and creative works of art.

**Keywords:** *AARON, Artistic creativity, Awareness, Experience.*

## Introduction and Problem Statement

The history of machine art production dates back to the 1950s, when artists began experimenting with machines to create works of art. In the 21st

century, the use of machines and technologies, including artificial intelligence, in art has brought significant changes and greatly affected the nature of artworks. This issue has led to raising important

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issues such as investigating the place and importance of artificial intelligence in the formation of works of art, which can be evaluated more accurately. One of the important questions in this regard is what is the role of artificial intelligence in the production of original works of art? In order to investigate this problem, the works of one of the first artificial intelligence machines named "AARON" will be analyzed as a case example. This machine was created by Harold Cohen<sup>2</sup>, one of the pioneers of this type of machine to create works of art.

Harold Cohen (1928-2016), a famous British artist and scholar, studied painting at the Slade School of Fine Arts in London. In the 1960s, he started learning computer programming and his activities in this field led to the intersection of art and technology. In such a way that he developed his software systems to create visual artworks and as a result he created an artificial intelligence program called AARON. AARON was designed to produce images and artistic compositions and was developed over several decades. Cohen programmed AARON with a set of rules, color choices, and visual preferences, allowing the program to make creative decisions and produce a wide range of artwork. Hence, Cohen's approach to computer art was unique because his goal was to simulate the creative process rather than simply replicate existing artistic styles (McCorduck, 1991, 3).

Theoretically, artificial intelligence is closely related to Functionalism as one of the approaches of the philosophy of mind. According to this approach, mental states are created only through their functional role. Some functionalists are of the opinion that just as different hardware can run a single software, different organisms with different physical-chemical compositions can have a single mental state. But John Searle, as one of the greatest philosophers of mind, has criticized their view with his Chinese room argument. In order to evaluate AARON's performance in the formation of the artwork, this research has considered Searle's approach and his Chinese room argument.

In order to examine the problem of the present research, in the first part, the relationship between artificial intelligence and functionalism will be explained. Among the topics of this section is the history of artificial intelligence. In the second part, the concept of strong and weak artificial intelligence is expressed from the point of view of John Searle and his Chinese Room argument. In this argument, there is a belief that although computers can imitate human behavior, they will never have empathy and awareness. In the third part, while introducing Harold Cohen, his works created by his machine AARON are described. Then, the performance of AARON will be evaluated based on the Chinese room test, in order to investigate the role of this machine in creating a work of art. In the following, problems such as AARON's lack of creativity and awareness to produce an original work of art are raised. In the final part, we try to present a new formulation of the fundamental concepts raised to show that despite the flaws, AARON has an important and undeniable role in the creation of the artwork.

Examining the role of artificial intelligence in the process of art creation leads researchers to identify the challenges, benefits, and potential disruptions that this technology creates in the world of art, and to apply it in this field with more awareness. Therefore, research about it is necessary.

## Research Background

Regarding the relationship between art and artificial intelligence, we can refer to the following articles: "The creativity code: art and innovation in the age of AI" (Du Sautoy, 2019), written by Marcus du Sautoy, has examined how to use artificial intelligence algorithms to produce art. "Computers and thought: A practical introduction to artificial intelligence" by Mike Sharples et al. (Sharples, Hogg, Hutchinson, Torrance & Young, 1989), covers topics such as expert systems, natural language processing, problem solving, and the potential for machines to exhibit intelligent behavior. In "Machine Art in the Twentieth Century", Andreas Broeckmann (2016)

provides a historical overview of machine-produced art during the twentieth century. Cetinic and She's article entitled "Understanding and creating art with AI: Review and outlook" (Cetinic & She, 2022), is a review article that looks at various aspects of how artificial intelligence technology can be used in the field of art, especially in creating and understanding artistic content. In the article "AI art: machine visions and warped dreams", Zylinska (2020) discusses the role of artificial intelligence in the production, interpretation and reception of works of art.

These articles provide valuable insights into the relationship between art and artificial intelligence, further exploring topics such as artificial intelligence engineering, the role of the artist, the impact of artificial intelligence on artistic practices, and the history of machine art. Meanwhile, the current research deals with the relationship between artificial intelligence and art with a philosophical approach. Among these types of writings, "AARON's code: meta-art, artificial intelligence, and the work of Harold Cohen" written by Pamela McCordock (1991) describes the life and artistic activities of Harold Cohen and his artificial intelligence system "AARON". This book traces AARON's development from his inception to his abilities as an independent creative being, and sheds light on the challenges and implications of using technology to create art. The current research has used the achievements of this book to examine AARON's works and explore the nature of creativity and the potential of artificial intelligence in artistic expression.

In connection with the criticism of Harold Cohen's works, we can refer to the following writings: Arthur Danto is among the critics of Cohen's thinking. His argument in the book (Danto, 1998) "Beyond the Brillo Box" is that AARON can create images that seem original and creative, but because he follows certain rules and processes, he faces some kind of limitation. Therefore, it cannot be as creative as humans. Stephen Davies (2012), in his book "Artistic Species: Aesthetics, Art and Evolution"

criticized Cohen's work, saying that while AARON's work may be technically impressive, it lacks the emotional depth and power of expression that characterizes human artwork. Because it has no real understanding or awareness of the world it depicts. Another philosopher of art, David Novitz (1999), in his essay "Creativity and Constraint", in his critique of Cohen's works, focuses on the limitations of AARON's creative process and criticizes his work for relying too much on pre-planned procedures and structured rules that they don't allow much improvisation, he criticizes, because it limits the program's ability to produce innovative work. On the contrary, he argues that one of the characteristics of creative works is their ability to break free from existing rules and produce something completely new and unexpected. The purpose of this research is to present arguments in opposition to the above opinions about the lack of creativity and not knowing the originality of AARON's performance in creating an artwork, and to analyze his artificial intelligence machine works from a point of view aligned with Cohen.

In connection with the desired approach to evaluate the fundamental concepts in the works of artificial intelligence, we can refer to John Searle's writings. In the book "Minds, brains and science", Searle (1984) discusses the unique nature of human consciousness and the challenges of replicating it in artificial intelligence systems. In his essay "Minds, Brains, and Programs" (Searle, 1980a), he presents his famous "Chinese Room" argument, which challenges the idea that a computer program alone can be sufficient for understanding or consciousness. The article "Intrinsic intentionality" (Searle, 1980b) aims to explain the issue that intention is irreducible to physical processes and cannot be fully explained only by brain states or computational operations. Overall, Searle's writings challenge reductionist and computational theories of mind and argue for a more nuanced understanding of consciousness, intention, and the limitations of artificial intelligence. His ideas are aimed at studying the relationship between

mind and brain and the nature of consciousness. Therefore, this research has used these writings in the field of discussion about artificial intelligence and the possibility of machine consciousness.

Considering the mentioned background, if the dominant view is influenced by Searle's approach and his Chinese room argument, AARON cannot produce an original work of art. However, the current research, by analyzing and re-reading the Chinese Room argument and reviewing fundamental concepts such as creativity, awareness, and experience, has gone beyond the limitations of the background and provided a reading in which artificial intelligence plays a constructive role in creating original works of art.

## Theoretical Foundations

### • Functionalism and artificial intelligence

The concept of artificial intelligence has a long history and its history goes back to Greek mythology, although its modern concept was formed in the middle of the 20th century with the development of computer science and the invention of the term "artificial intelligence". This term was coined in 1956 by John McCarthy, Marvin Minsky, Nathaniel Rochester and Claude Shannon at the Dartmouth Conference, which is considered a very important event in the history of artificial intelligence. In this conference, researchers from different disciplines gathered to discuss the possibility of building a machine that is capable of simulating human intelligence (McCarthy, Minsky, Rochester & Shannon, 1956); (Russell & Norvig, 2010).

Artificial intelligence is closely related to functionalism approach in philosophy. The roots of functionalism go back to the works of William James<sup>3</sup> (the father of functionalism) (James & Burkhardt, 1983). The term functionalism was first used in the early 20th century by the American philosopher and psychologist John Dewey. Based on his argument, mental processes should be studied based on their purpose and function and not their content and structure. This important approach was

developed during the twentieth century, especially by philosophers such as Gilbert Ryle (Ryle, 1949), Hilary Putnam (Putnam, 1967) and Jerry Fodor (Fodor, 1981), as well as psychologists and cognitive scientists such as George Miller (Miller, 1956) and David Marr<sup>4</sup> (Barlow, 1983).

Today, functionalism is an important and influential approach in the philosophy of mind. Among the philosophers of this field, Hilary Putnam (1926-2016), an American philosopher, made a significant contribution to its growth. He is known for his work in various fields including philosophy of mind, philosophy of language and philosophy of science. His activities led to more progress and reforms in the philosophy of mind and also led to a more accurate understanding of the relationship between mental and physical phenomena. Putnam's argument in the article "The nature of mental states" can be expressed in such a way that mental states should not only be explained based on their relationship with behavior, but it should be clarified how they are semantically meaningful. He believed that the meaning of mental states is determined by their role or function in a cognitive system. Also, he investigated the problem of multiple realizability for the first time in an article titled "Psychological Predicates" (Putnam, 1967, 162). Functionalism is very closely related to this concept. In addition, it is of central importance for artificial intelligence. Multiple realizability expresses the idea that every mental process can be realized in different physical systems instead of being limited to a physical system with specific material coordinates. For example, while humans may experience pain due to specific neural processes of the mental state, other creatures, such as octopuses or even artificial intelligence, may experience pain through completely different physical processes (Ravenscroft, 2008, 82 -78).

In this connection, functionalism believes that mental states and processes can be defined based on their functional roles and not specific physical characteristics. This view in functionalism is completely aligned and compatible with the idea of

multiple realizability because it makes it possible for mental states and processes to be realized in various physical systems while maintaining their causal role. In connection with artificial intelligence, it can be said that this concept expresses the idea that an intelligent behavior can be realized in different ways. This idea has a fundamental role in artificial intelligence because it makes it possible to create intelligent behavior in different physical systems without changing the functional characteristics of that behavior (*ibid.*, 87-98).

The theory of multiple realizability has been faced with many criticisms, but the most important of them is related to this research. It is a criticism that John Searle made in 1980 under the title of The China Room. In fact, Searle's argument is a thought experiment that tries to show that a computer program, no matter how expert and advanced, cannot properly understand language or true intelligence.

#### • China room argument and criticism of artificial intelligence

The reasoning behind the Chinese room is as follows: suppose a person is locked in a room and given a large package of Chinese writings. That person does not know how to read and write Chinese, and the writings in his opinion are distorted and meaningless lines. He is then given a second packet, which contains writings in Chinese along with a set of rules to link the two packets. These rules are in English and enable him to associate the first set of formal symbols with the second set of these formal symbols<sup>5</sup>. Next, he is given a third set of Chinese symbols with instructions in English, which enables him to relate the elements of the third set with the first two sets. These rules guide him how to return certain Chinese characters with certain types of shapes in response to specific types of shapes given to him in the third packet. The people who give him these symbols call the first package "writings", the second package "stories" and the third package "questions". In addition, the symbols that he gives in response to the third package are called "answers to questions" and the set of rules that were given to

him in English are called "program". Let's say that after a while that person tries to use those rules to move Chinese symbols so well that from the perspective of someone outside the room, his answers to questions are indistinguishable from those of native Chinese speakers (Searle, 1980a, 417-418).

In this test, the person who is in the room behaves like a computer in the way that he performs Computational operations on specific formal elements. Searle's argument can be expressed as this thought experiment shows that the computer program does not understand natural language but merely manipulates symbols based on the rules given to it. In other words, the program is not really intelligent, but simulates intelligence. The program may return answers that seem intelligent, but that doesn't mean it understands what those answers mean. In further explanation, it can be said that the distinction between real and simulated answers in this argument means that real answers require understanding the meaning of inputs to the program and also the ability to create answers based on understanding those meanings. While simulated answers simply mean providing answers based on a set of rules and algorithms without necessarily understanding the inputs (Searle, 1984, 29).

To better understand the consequences of this argument, it is necessary to consider the distinction between strong and weak artificial intelligence. Strong artificial intelligence refers to the idea that machines can have true consciousness or understanding, as well as all the cognitive abilities of humans in a true sense. On the other hand, weak artificial intelligence is an attitude according to which machines can only simulate human cognitive abilities in a limited area. Searle's critique in The Chinese Room is mostly focused on strong artificial intelligence. What he suggests in The Chinese Room is that it is impossible to build a machine that is capable of understanding thought and natural language in a natural sense. Rather, machines can only simulate understanding, but in no way do they have understanding and awareness in the sense that humans have (Searle, 1980b, 450-457).

According to the above explanations, the necessary

preparations have been made to raise the main issue. As mentioned earlier, many artists have used artificial intelligence to create works of art. Among the most important of them, who dealt with the relationship between human creativity and machine intelligence, is Harold Cohen. He believed that the machine he created can produce works that are as meaningful and expressive as human works of art. In the future, using the above interpretations, his works will be carefully evaluated.

### Research Method

The method of this research is based on the description and analysis of concepts. By using library and field resources and reviewing magazines, mass media and internet resources, data related to artificial intelligence and the artworks resulting from it, including the works of AARON's machine, have been collected. In the following, the desired data are described in a qualitative manner and then analyzed and evaluated. In order to evaluate AARON's performance in the formation of the artwork, this research has taken into consideration John Searle's approach and his Chinese room argument, and at the end, it has provided reasons for criticizing the results of this evaluation.

Artificial intelligence in the works of Harold Cohen: Harold Cohen is a British painter and inventor and one of the pioneers of computer art. In 1971, he created a painting system called "AARON". This system is the first and most complex artificial intelligence system that has produced works of art. In his initial program, he defined a small set of rules and forms for the computer to turn them into drawings. The initial output of this system was black and white paintings, many of which Cohen initially colored by hand (Fig. 1).

Cohen's work with AARON represented a unique collaboration between man and machine. The artwork "Garden of Socrates" was one of AARON's masterpieces. To present it, Cohen enlarged the images produced by AARON and painted them with acrylic, then mounted each form on plywood and



Fig. 1. Harold Cohen, Drawing by AARON, Indian ink on paper, 22 x 30 cm, 1986. Source: <https://www.researchgate.net/>

presented them in the form of a tree arrangement (Fig. 2).

AARON's system, like any artist, went through stages in the process of creating his works. The early forms, which resembled children's drawings, gradually progressed to more biomorphic forms. Further innovations in the 1980s allowed Cohen to expand AARON's knowledge base (Cohen, 1995, 142). In 1995, Cohen presented a version of AARON that not only drew shapes, but could also color them. The coloring of the paintings was almost indistinguishable from the coloring Cohen had done by hand for AARON's paintings a decade earlier. With this method, images of people, plants and tables were created (Fig. 3).

When AARON creates a painting, it saves the process of creating it in a file as a set of instructions. Most of these instructions control the basic design, the movement of the brush on the paper and the filling of the paint. Some of them specify the combination of colors for separate parts of the painting, and others determine the size of the brush. AARON never thinks about coloring before painting, the painting is done first, then AARON decides on the color. As AARON grew and learned, he could tell when a work of art was finished.

Cohen compared his relationship with AARON to the relationship between Renaissance painters and their studio assistants. Is the fact that AARON creates



Fig. 2: "Socrates Garden", Buhl Science Center.  
Source: <https://computerhistory.org>.



Fig. 3. Image created by AARON, Boston Computer Museum, 1995.  
Source: <https://www.nytimes.com/2016/05/07/arts>

works of art evidence of computer intelligence? In this case, Cohen believed that AARON was doing exactly what human artists do, receiving knowledge of forms and applying them: the process of creation (Cohen, 1999, 34). In the following, to investigate AARON's role in the formation of the artwork, his performance will be analyzed in the form of Searle's Chinese room argument.

### Analysis of AARON's Works Based on the Argument of the Chinese Room

Considering the works of art that Cohen created in collaboration with AARON and his writings, it can be seen that he was one of the defenders of "strong artificial intelligence" in art. In the sense that he believed that machines can produce original intelligence and creativity and not just repeating

it. In the book "The Aaron Code" by McCorduck (McCorduck, 1991), it is stated that Cohen believed that AARON created original works of art based on his own rules and procedures. In the sense that his works are not merely a derivative of something that humans can create, but are the result of an autonomous and independent creative process. Also, in his interview with the "American Art and Culture Magazine" (Cohen, 1992), he is of the opinion that AARON is not just a tool for creating art, but plays an active role in the creative process of art, so that he is able to make his own decisions in creating works of art. Therefore, his main goal in connection with AARON was to build a system that can have independent creative thinking. But the question that arises here is whether the performance of a machine like AARON can indicate an independent creative process? The reasoning of Searle's China Room provides a good criterion and yardstick for measuring the role and possibility of artificial intelligence in the field of art. As a result, to answer the questions raised, AARON's performance is put in this thought experiment. For this purpose, at first, the main elements of the argument of the Chinese room can be categorized as follows:

1. Someone in the room (who doesn't speak Chinese)
2. A set of Chinese symbols (input)
3. A manual (program or algorithm) containing instructions for manipulating Chinese symbols.
4. Chinese symbols (as output)

In the Chinese room test, the person inside the room receives inputs in the form of Chinese language. It then applies the instructions to move the symbols and produce an output. This output is also in Chinese. In this test, it appears that the person in the Chinese room does not understand Chinese, but can still give coherent answers by following the rules or instructions. Now, according to recent considerations, AARON's function is being reconstructed in the form of a Chinese room.

1. The person in the room is comparable to AARON. (corresponding to Aaron's program)
2. Corresponding to the Chinese symbols (which

were input), rules and procedures are given that guide AARON in producing the artwork. The Chinese symbols (inputs) correspond to any basic data or initial conditions<sup>6</sup> that AARON may have, such as color palettes, styles, and other information related to the production of the artwork.

3. The manual (program or algorithm) here are the algorithms that Cohen wrote for AARON.

4. The output in the Chinese room was Chinese symbols and here are the works that AARON creates.

In this reconstructed scenario, AARON is the person in the china room who creates works of art by following rules, guidelines and algorithms. Just as the person who was in the Chinese room did not understand the true meaning of the Chinese language, it can be said that AARON does not have a real understanding of the art production process and does not have knowledge. AARON can produce artwork by following the rules and procedures programmed into it. But he doesn't have the subjective experience or creative insight that a human has. With these interpretations, two main reasons can be put forward for why AARON cannot produce works of art like humans:

- **Lack of awareness and intentionality<sup>7</sup>**

The above argument includes the conclusion that true artistic activity requires intentionality and awareness, and AARON as an artificial intelligence program lacks it. Awareness and intentionality play an important role in the process of creating original works of art because they enable the artist to understand, interpret and express his unique views and ideas. Consciousness is the basis of artistic creation because it involves paying attention to the surrounding world, actively understanding and observing details, thinking deeply about feelings and experiences. Through this careful observation, the artist can capture the essence of his subject. Consciousness is also vital in the creative process, because it helps the artist to analyze the various visual elements that are required to create a work of art and to reach the desired artistic results and to develop his individuality.

Meanwhile, AARON has no real understanding or personal experience in the process of creating an artwork. He follows predetermined algorithms and rules or, in other words, manipulates Syntax without understanding their Semantics. These considerations challenge the authenticity of the works created by AARON. In addition, AARON cannot have mental states and intentionality, as an inseparable feature of mental states. This makes it impossible to attribute a true meaning or purpose to what it produces.

- **True creativity and reliance on a programmer**

The second reason is related to the importance of creativity and the role of the programmer. From the above argument, it can be concluded that the work produced by AARON is ultimately the result of Cohen's creative vision rather than being AARON's own unique and true creativity.

As we know, creativity is very important in creating an original work of art. Because it gives the artist the possibility to distance himself from established conventions and norms, to overcome challenges and by finding new solutions, to produce original and unique ideas that will make his works effective and lasting. Creativity allows the artist to express his thoughts, feelings and views in a deeply personal and meaningful way and even transform abstract ideas into concrete forms. Through creative exploration, the artist can discover hidden talents and new artistic possibilities, to continuously evolve his artistic activity. Therefore, creativity drives artistic innovation and contributes to the evolution of art as a whole.

Meanwhile, AARON's creativity is limited to the rules and algorithms that Cohen wrote for it. AARON is merely carrying out the instructions and applying the knowledge given to him by Cohen. It is influenced by Cohen's beliefs, feelings and experiences without actually being an artistic agent in the production of the work. Therefore, this dependence on the programmer challenges AARON's original creativity.

It seems that the above considerations bring serious problems to the originality of AARON's performance



in producing an artwork, but this does not mean that these problems can easily deny AARON's role in producing an original work of art. In the following, by further analyzing the assumptions contained in these two criticisms and describing the fundamental concepts related to them, including presenting a new formulation of the concept of creativity, it will be shown that it is not the case that AARON necessarily lacks any knowledge. In addition, the role of a programmer does not exclude AARON's function as a creative being. As a result, it is not possible to discard and ignore AARON's role in the production of an original work of art based on criticisms such as the Chinese Room.

## **A reply to the China Room Argument**

### **• Evolving complexity**

Evolving complexity refers to a system's ability to learn, adapt, and improve over time and become more complex. AARON is designed to learn and evolve over time. This feature allows it to develop its creative abilities. As a result, its artistic outputs can become more complex over time, which itself indicates an increase in the level of understanding and awareness, even if this awareness is not similar to human awareness.

For example, imagine a student begins to learn mathematics. First, it starts with basic operations. With further progress, he will learn more complex topics such as multiplication, division and finally more advanced concepts such as algebra, differential calculus, etc. A student's understanding and problem-solving ability becomes more complex over time with learning and practice. By the same analogy, it can be said that AARON also evolves with learning. Its algorithms and rules are not fixed, but it can adapt them based on the data it receives and the experiences it has. As it creates more art, it learns from its successes and failures and adjusts its algorithms and rules accordingly, much like a student learning mathematics. As AARON's algorithms evolve, its artistic output becomes more complex. This growing complexity can be seen as a

reflection of a deeper level of understanding in the process of creating art.

Cohen did not program AARON to draw specific images, but instead encoded general rules about space, color and form, and AARON used these rules to produce images. Over time, Cohen updated these rules based on what he learned from AARON's output and his developing understanding of artificial intelligence and art. This process allowed AARON to create more complex works of art.

The evolving complexity of AARON's work can be seen in the way the program has developed from its earliest versions to today. In the 1970s, AARON was able to create simple line drawings of abstract shapes. There was no use of color at all. The images were attractive but lacked the complexity and depth of 3D works. In the 1980s-1990s, AARON began to create more complex scenes, including figures interacting with each other and their environment. It also began to use color more effectively, adding another layer of complexity to its artwork. Since 2000, AARON has been able to create works that include complex patterns and color scenes, showing a high level of understanding of artistic principles (Cohen, 1999, 26-35).

Throughout these stages, AARON's evolving complexity is evident in the increasing complexity of its artwork. Its ability to create complex artworks over time is indicative of its evolving creative capabilities. This complexity comes not from a programmed rule, but from the interaction of multiple rules and algorithms, reflecting the inherent complexity of human artistic creativity.

### **• Expanding the concept of creativity**

These days, the boundaries of what is considered creative or original work are constantly changing. By questioning the traditional concept of creativity, Aron has contributed to the discourse on the nature of art and creativity. As traditionally understood, creativity is often tied to human characteristics such as consciousness, emotions, and personal experience. When an artist creates a work, he uses his unique perspective and emotional understanding

of the world to give the work of art deep meaning. However, with the advent of artificial intelligence systems like Aron that are capable of producing artwork, it can be argued that we need to re-evaluate and expand our understanding of creativity.

It can be argued that AARON is producing a true work of art, that creativity is not simply something about subjective experience or the artist's whims or intent. Rather, it is aimed at the process of producing new ideas and works of art. To illustrate this point, let's consider the invention of photography. At first, many did not consider photography a form of art because it mechanically reproduced reality. However, over time, when photographers began to use this medium to express their unique views and feelings, photography became widely recognized as an art form. Similarly, AARON and other AI art programs are helping to evolve what is considered creative or original. By producing works of art through algorithms and rules, AARON shows that creativity can also come from unexpected and novel combinations of pre-existing elements, regardless of whether it is primarily as a program has a subjective experience or an understanding of the process of producing an artwork or not.

In algorithmic composition, an artificial intelligence system can be trained on a large dataset of songs and musical theories and then produce unique compositions. AI may not have an emotional connection to the music it creates, but its output can evoke emotion in listeners and be considered creative. This example begs the question, if a piece of music is considered creative because of the effect it has on the listener, regardless of the emotional connection it creates, shouldn't the same be true of a painting produced by artificial intelligence? AARON, too, while devoid of human consciousness or emotion, is capable of producing art that is visually appealing. If the merit of art lies in its ability to evoke emotion and thought or to create aesthetic pleasure for the viewer, then AARON's output can indeed be considered creative, even if it lacks the same understanding as humans. Therefore, creativity

should not be defined only by the consciousness of the creator or the manifestation of personal emotion. Instead, creativity can be judged based on the novelty, aesthetic value, and emotional impact of the work itself. AARON forces us to rethink and potentially expand our definition of creativity by acknowledging the creative potential of AI and its role in art creation. There is another point to explain about creativity:

#### • **Unpredictability and originality**

A key aspect of creativity is the capacity to produce something new, unexpected, or original. AARON's way of creating works of art is defined by Cohen based on algorithms and rules to reach the aspects of human artistic creativity. While AARON operates within the limits of his programming, the works produced are the result of complex and emergent behavior that is the result of the interaction between algorithms and rules. This interaction leads to the creation of outputs such as unexpected and novel artistic patterns or combinations that may not have been directly planned by Cohen. Although it may be said that AARON lacks subjective experience, awareness, and understanding, this unpredictability and novelty can be considered a form of creativity, as it produces unique art that is not merely a reflection of its programmer's intentions. Therefore, as long as AARON can go beyond the limitations imposed by his programmer and produce innovative and visually attractive outputs due to the complex interactions of algorithms and rules, his work is considered original. To give a concrete example, consider a child playing with Lego blocks. Each Lego block represents a rule or algorithm in AARON's programming. A child, like AARON, can arrange these blocks in countless ways, leading to many possible outcomes. Some constructions may be predictable, such as a simple tower, while others may be surprising and novel, such as a complex spaceship. The element of surprise and novelty in the final structure can be considered a form of creativity. Similarly, AARON can create artistic combinations that Cohen may not have imagined. These unexpected results help to understand his work as a creative work.

Consider another example where AARON is instructed to create a combination of human figures and plants. He has rules for creating these figures and plants and for arranging them in a composition. However, the exact method of combining these elements is not explicitly planned by Cohen but is determined by AARON's algorithms that take into account various factors such as the spatial relationships between elements and the balance of the composition.

AARON may combine shapes and plants in a design in such a way that a pleasant visual balance of positive and negative space is created. In another design, he may unexpectedly decide that several shapes overlap, resulting in a more dynamic and complex composition. These results are not directly controlled by Cohen, but are the result of decisions based on AARON's law. This element of unpredictability and novelty creates a special excitement in the process of working with AARON. Cohen himself may be surprised by the results, which can lead to new insights and directions in AARON's programming, creating a dynamic and evolving creative process. In the following, certain aspects of AARON's artistic output will be discussed to demonstrate the element of unpredictability and novelty.

**Line drawings of human figures:** In the early stages, AARON was programmed to create simple line drawings of human figures. Figures were created using a set of rules for drawing different parts of the body. Despite these rules, due to the random elements in the algorithms, AARON was able to produce unique works. For example, the exact curvature of a line or the angle of a limb was not predetermined, but was decided by AARON within the scope of its planning to draw it. This process led to the formation of a series of figures, each of which had its own position and posture, which can be considered as unexpected and original results.

**Color Selection:** When AARON was programmed to use color, it was given a set of rules to determine the color selection for each painting. However, the

exact colors used in each work were not directly controlled by Cohen. Instead, AARON chose colors according to its programmed rules, which resulted in unexpected color combinations that added a new level of visual beauty to the paintings. The resulting artworks displayed a unique interplay of contrasting colors that Cohen might not have anticipated.

**Complex Compositions:** As its abilities evolved, AARON began to create more complex compositions involving multiple faces and elements. The arrangement of these elements was not explicitly controlled by Cohen, but was decided by AARON based on its algorithms. This led to surprising compositions, such as shapes that overlapped in unexpected ways or elements that were arranged in a new pattern to create a striking visual effect (Cohen, 1995, 145).

These examples show how AARON can produce new and unpredictable results within the constraints of his programming and add a level of creativity to go beyond those constraints.

#### • **Human and artificial intelligence interaction**

The art produced by AARON and Cohen can be considered as an example of the interaction between the two. It wasn't like Cohen just programmed AARON and then stepped back to let it create art on its own. Rather, his relationship with AARON was an ongoing collaborative process that evolved over time. So that the creativity of both of these were combined in the output of the work and a new form of artistic expression was provided that neither Cohen nor AARON could achieve alone. As a result, the partnership is valuable in that Cohen brings his intuition and artistic experience, while AARON uses its ability to create unexpected and novel compositions based on its own planning.

It is true that AARON is not independent in this collaboration, but it is not the case that the output of the work is all exclusive to Cohen. Like a musician who wants to compose a piece of music and uses an artificial intelligence program that can generate melodies and harmonies based on input parameters such as genre, tempo and key. The musician sets the

parameters and then listens to the music produced by the AI. It may find parts of the generated music inspiring, then take the resulting ideas and combine them with its own creativity, ultimately creating a new piece of music that reflects both the AI's suggestions and its own ideas. AARON also creates new works based on the inputs provided by Cohen. So in this collaboration, Cohen provides his artistic background and vision, while AARON offers innovative, algorithm-driven ideas that may not have been conceived by Cohen alone.

In the early stages, Cohen programmed AARON to make relatively simple line drawings of mostly human figures and plants. The choices AARON made within these constraints, such as the position of figures, the way lines were drawn, and the composition of elements, reflected a new form of creativity. Over time, Cohen expanded AARON's programming to include more complex colors and combinations. For example, creating figures with interesting overlapping forms. Cohen decided to enhance this aspect by introducing color to highlight these overlaps. This ongoing dialogue between Cohen and AARON's output led to more engaging artwork. In more recent stages, AARON's artwork has evolved to include complex compositions and multiple figures with a richer color palette. This evolution reflects both AARON's learning through the rule-based system and Cohen's input and artistic bias (Cohen, 1999, 35).

These stages of AARON's work show that Cohen's role is not simply to set the schedule. He constantly observes, evaluates and adjusts AARON's programming based on the artwork he produces. Cohen's creativity and intention are transferred to AARON through the algorithms and rules that are written. From this point of view, AARON's work can be considered genuine because it is an extension of Cohen's creative vision that is revealed by this program. When we look at AARON's artwork, we're not just seeing the output of an AI program. We see the result of a unique human-artificial intelligence collaboration that pushes the boundaries

of traditional art. This innovative and experimental approach opens new opportunities for creativity and originality in art.

## Conclusion

As an artist, Harold Cohen attempted to transform the nature of representation in his work more than he had ever done with painting. For this purpose, he took a unique approach, which was to use AARON as an artificial intelligence machine. As a result of using this machine, he created rich and unique works. Some critics were of the opinion that although Cohen intended to push AARON to the point where he could produce works equal to human art, the works he creates are produced by an intelligent machine that does not necessarily have the same intelligence as humans. According to their criticisms, AARON cannot be creative. Also, it is not independent from Cohen in the creation of any of his images. They believed that any success the program had in creating complex images was based on having the knowledge programmed through Cohen.

In this research, in order to accurately evaluate the criticisms raised and investigate the true role of AARON in the production of original artwork, the performance of this machine was evaluated. This evaluation was based on the argument of the Chinese room, which is one of the most important tests of artificial intelligence criticism. In the first part, using the Chinese room test, it was shown what criticisms can be made to AARON in the production of artwork. Among these criticisms are that; AARON can be considered an intelligent machine that has the same abilities as humans, but due to not having human intelligence, experience and awareness, and also not being independent from humans in the process of creating artwork, it cannot produce original art works like humans.

Taking the China Room argument as a valid test, it seems that AARON could not have played a significant role in the production of original works of art. But despite this expectation, the present research in the second part tried to show that the re-

examination of this argument and the assumptions contained in it shows another picture in which artificial intelligence plays a decisive role in the production of original works of art. For this purpose, in this section, a re-analysis of the concept of awareness and creativity was presented as follows.

The China Room argument assumed that true artistic activity requires consciousness, and AARON lacks consciousness. In response to this assumption, it was argued that AARON's design is such that it learns and evolves over time, and in this process, the value and originality of its artistic product changes. Also, its artistic outputs become more complex over time, which indicates an increase in the level of understanding and awareness. Another assumption of the Chinese room was that AARON's creativity is limited to the rules and algorithms that Cohen wrote for it. Therefore, this dependence on the programmer challenges AARON's original creativity. In response to this assumption, it was argued that the art produced by AARON was the result of an ongoing collaborative process with Cohen. So that the creativity of both of these were combined in the output of the work and a new form of artistic expression was provided that neither Cohen nor AARON could achieve alone. In addition, in order to show that AARON produces a true work of art, it was argued that creativity is not only something about subjective experience or artist's intention, but it is about the process of producing unexpected or novel ideas and works of art. Since AARON's way of working in the production of works of art has always led to the creation of unexpected and original outputs, it can be said that it has a unique creativity and plays an important role in the production of original and creative works of art.

This research clearly showed that the reformulation of the Chinese room and the analysis of assumptions related to creativity and consciousness show that, contrary to the common formulation of the Chinese room, it is not the case that artificial intelligence cannot produce original works of art. AARON challenged the traditional understanding

of creativity by producing art through algorithms and rules rather than human intuition or inspiration. With this unconventional approach, it put Cohen in a continuous dialogue with the art world, because he raised difficult questions about the meaning of creativity and the nature of works of art. Finally, the arguments presented in this research showed that it is possible to have a different understanding and image of AARON's role as artificial intelligence in the creation of artwork. His work invites us to reconsider our preconceived notions about artistic creation and presents us with new opportunities to explore and raise new questions.

## Endnotes

1. AARON's painting system was created in 1971 and evolved until the death of its inventor, Harold Cohen, in 2016.
2. Harold Cohen is a British painter and inventor and one of the pioneers of computer art. In 1971, he created a painting system called "AARON".
3. William James (1842-1910), an American philosopher and psychologist, challenged the reductionist tendencies of structuralism and founded functionalism as a more comprehensive and pragmatic approach to understanding the mind and behavior. The functionalist approach promoted by James led to the exploration of various topics, including the role of consciousness, the study of mental processes in real-life contexts, and the understanding of the mind as a functional system.
4. In this work, Marr presents a functionalist analysis of visual perception.
5. It should be noted that the meaning of "formal symbols" is the appearance of words, and a person can recognize these symbols based on their shape and appearance.
6. The initial conditions are the parameters that AARON has before starting the process of creating an artwork, such as canvas size, color palette, accurate understanding of color, and composition and form, any restrictions related to shapes and styles, and any information that in any way, they affect the production process of the work.
7. intentionality refers to the characteristic (about something) or (about) mental states.

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