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## ARTIFICIAL INTELLIGENCE AND POSTMODERNITY: CAN AI CREATE AVANT-GARDE ARCHITECTURE?

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### SZTUCZNA INTELIGENCJA I POSTMODERNIZM: CZY AI MOŻE TWORZYĆ AWANGARDOWĄ ARCHITEKTURĘ?

#### Abstract

Contemporary architecture operates within postmodernity – an era marked by the decline of unified styles and narratives in favor of pluralism and variability. The avant-garde, once a symbol of rebellion and formal innovation, seems forgotten or reduced to fashion. In this context, can artificial intelligence become a source of radical creativity? Can AI generate truly avant-garde architecture – bold, emotional, and disruptive? This article examines the relationship between AI and the avant-garde in today's architectural culture. It explores how generative models create new forms, and questions whether AI merely imitates history or can transcend it. Instead of seeing AI as a threat to architectural identity, the article presents it as a potential heir to the avant-garde – a creative partner capable of challenging norms and expanding architectural imagination.

*Keywords: architectural creativity, artificial intelligence, avant-garde architecture, generative design, postmodernism*

#### Streszczenie

Współczesna architektura funkcjonuje w ramach postmodernizmu – epoki naznaczonej upadkiem zuniifikowanych stylów i narracji na rzecz pluralizmu i zmienności. Awangarda, niegdyś symbol buntu i formalnej innowacji, wydaje się zapomniana lub zredukowana do mody. Czy w tym kontekście sztuczna inteligencja może stać się źródłem radykalnej kreatywności? Czy AI może generować prawdziwie awangardową architekturę – odważną, emocjonalną i przełomową? Niniejszy artykuł bada związek między AI a awangardą we współczesnej kulturze architektonicznej. Analizuje, w jaki sposób modele generatywne tworzą nowe formy i kwestionuje, czy AI jedynie naśladuje historię, czy może ją przekroczyć. Zamiast postrzegać AI jako zagrożenie dla tożsamości architektonicznej artykuł przedstawia ją jako potencjalnego spadkobiercę awangardy – kreatywnego partnera zdolnego do kwestionowania norm i rozszerzania wyobraźni architektonicznej.

*Słowa kluczowe: kreatywność architektoniczna, sztuczna inteligencja, architektura awangardowa, projektowanie generatywne, postmodernizm*

## 1. INTRODUCTION

Contemporary architecture functions in a post-postmodern reality, marked by stylistic, technological, and ideological pluralism. Instead of the dominance of one trend, we observe

the coexistence of many approaches – from parametricism, through sustainable architecture, to speculative digital forms. In this context, the avant-garde, once a symbol of rebellion and radical formal innovation, today seems to be reduced to aesthetics or a fashionable gesture, devoid of its original critical power. It is therefore worth asking whether artificial intelligence, as a tool with enormous generative potential, can become a source of authentic, radical creativity and a contemporary avant-garde in architecture.

Historically, the avant-garde has been defined as a radical break with tradition, striving to break established patterns, introduce novelty and originality, and question prevailing aesthetic and ideological norms. The early 20th-century avant-garde was distinguished by its radicalism and innovation, expressing a desire for progress. Avant-garde forms were characterized by a bold dynamism and experimental approach, including the use of new materials and the renunciation of unnecessary ornamentation. The avant-garde in architecture is not only a specific style, but above all a way of thinking about space focused on breaking conventions and seeking new solutions.

The 20th-century architectural avant-garde, represented by movements such as Constructivism, radical Modernism, and Deconstructivism, was a force that challenged both the formal and social order. The utopian visions of the Archigram group and the experiments of Lebbeus Woods were expressions of a radical spatial imagination, often ahead of the technological possibilities of their era<sup>1</sup>. Their common characteristic was not only a break with tradition but also a demand for redefining architecture's function as a tool for cultural transformation. The question of whether AI can assume this role requires reflection not only on its formal capabilities but also on its ability to generate visions that transcend the framework of input data. Postmodernism, which developed in the 1960s, was a reaction to the rationalism and functional rigor of Modernism. Postmodernists rejected the idea of universal design rules, turning to ambiguity, historical quotations, and diverse languages of architecture. Their goal was to restore meaning, the play of contexts and open up to the recipient.

Contemporary research on generative artificial intelligence (AI) in architecture shows the significant potential of AI as a tool supporting the creative process. Thanks to the technology of generative adversarial networks (GAN), it is possible to generate diverse, innovative, and practical architectural solutions. Research indicates that AI can also be used to generate alternative design options based on local cultural identity.

However, the key question concerns the nature of AI creation. Generative AI models are based on training data, which means that their “creativity” consists of interpolation between existing examples. The question then arises: can this be considered a true innovation or merely a complex recombination of preexisting forms? The complexity of this issue is added by the fact that an analysis of the process of human creativity in design reveals that humans also rely to a large extent on previous experiences and learned patterns<sup>2</sup>.

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<sup>1</sup> L. Maluga, *Lebbeus Woods – Between avant-garde and science fiction* [in:] T. Kozłowski (red.), *Defining the architectural space – Avant-garde architecture*, vol. 2, Oficyna Wydawnicza Atut, Wrocławskie Wydawnictwo Oświatowe, 2022, pp. 85–99.

<sup>2</sup> P. Rupperecht, W. Mayrhofer, *Hybrid intelligence – An approach towards the symbiosis of artificial and human creativity and interaction in the design and innovation process in SMEs* [in:] E. Markopoulos, R. S. Goonetilleke, Y. Luximon (eds), *Creativity, innovation and entrepreneurship*, AHFE International 2024. DOI: 10.54941/ahfe1004718.

## 2. ARCHITECTURE BEYOND POSTMODERNISM

Contemporary architecture exists in what scholars increasingly recognize as a metamodern condition, a synthesis that moves beyond the fragmentation of Postmodernism while avoiding the rigid normativity of Modernism. According to Kizilkan and Arabacioglu this metamodern approach “shares pluralism with postmodernism, but instead of fracturing it like deconstructivism, it seeks continuity as a hopeful opposition to modernism’s strict normativity”. The implications for architectural practice are profound: we inhabit a design landscape characterized by a sensitivity that redefines traditional spatial boundaries and challenges conventional architectural categories<sup>3</sup>.

This condition manifests in the erosion of architectural coherence that characterizes our global built environment. As a study by Meng observes, “architectural design styles of more and more cities tend to be similar, and the original architectural design styles of each region are gradually disappearing or being replaced by homogenized buildings”<sup>4</sup>. The result is what Marc Augé conceptualized as non-places – spaces devoid of cultural specificity or meaningful human connection<sup>5</sup>. These environments, increasingly common in our globalized world, lack what Christian Norberg-Schulz termed *genius loci* – the spirit or character that distinguishes meaningful places from mere spatial containers<sup>6</sup>.

The consequences extend beyond aesthetics to fundamental questions of architectural meaning. The Vitruvian triad of *firmitas*, *utilitas* and *venustas* (strength, utility, and beauty), principles that have guided architectural thought for millennia, appear increasingly fragmented in contemporary practice<sup>7</sup>. Modern buildings often prioritize efficiency over beauty, structural economy over durability, resulting in what one critic describes as architecture “without soul”. This fragmentation reflects broader cultural shifts, where traditional values and unified aesthetic principles have given way to market-driven pragmatism and stylistic plurality.

### 2.1. CREATIVITY AND ARTIFICIAL INTELLIGENCE

Creativity can be defined as an individual’s ability to generate new ideas or to reframe existing ideas. Terms such as innovation, invention, heuristics, and inventiveness are associated with the concept of creativity<sup>8</sup>. Generative AI is replicative in nature – it can recombine and reorganize existing elements, but this can lead to a long-term loss of human creative skills and attitudes. AI-generated creativity raises debates regarding the loss of emotional depth and originality, highlighting the tension between technological progress and traditional creative

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<sup>3</sup> G. Kizilkan, F.P. Arabacioglu, *Metamodernism unveiled: A contemporary aftereffect in architecture*, “Kuram Ve Uygulamada Sosyal Bilimler Dergisi” 2024, no. 1, pp. 127–141.

<sup>4</sup> Y. Meng, *Research on factors affecting architectural style – Shaanxi Provincial History Museum as an example*, “Communications in Humanities Research” 2023, no. 4, pp. 157–163.

<sup>5</sup> M. Augé, *Non-places: Introduction to an anthropology of supermodernity*, Verso, London/New York 1995.

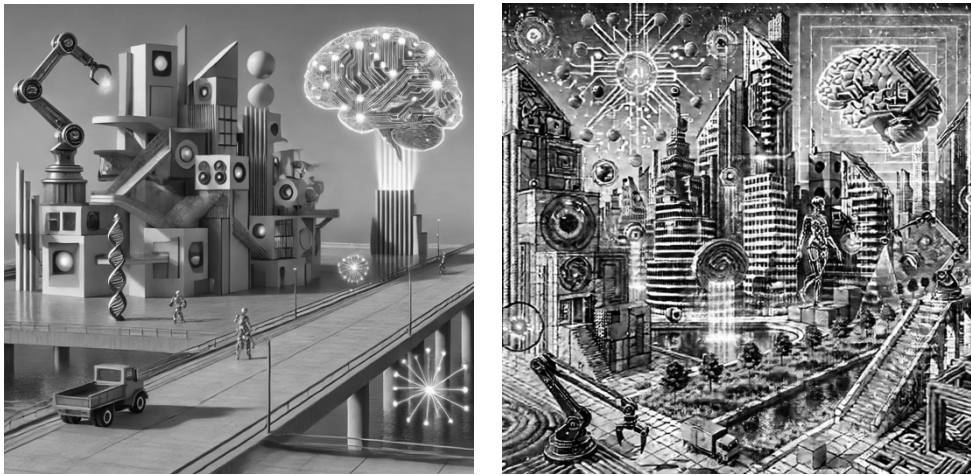
<sup>6</sup> C. Norberg-Schulz, *Genius loci: Towards a phenomenology of architecture*, Rizzoli, New York 1991.

<sup>7</sup> J. Marchwiński, E. Lucchi, *Firmitas, Utilitas, and Venustas of photovoltaic architecture*, “Solar Energy” 2024, vol. 282, art. no. 112974, <https://www.sciencedirect.com/science/article/pii/S0038092X24006698> (access: 30.09.2025).

<sup>8</sup> M. Kosała, *Przedsiębiorczość kreatywna – inwentyka, kreatywność i pomysły kreatywne* [in:] W. Pasierbek, K. Wach (eds), *Przedsiębiorczość*, vol. 5, Wydawnictwo Naukowe Akademii Ignatianum w Krakowie, Kraków 2022, pp. 275–294.

practices. Furthermore, the random nature of AI creativity and its dependence on a rich training database require a reassessment of traditional creativity metrics.

To be considered avant-garde, AI architecture must not only offer a new form but also raise questions about the meaning, identity, and future of the built environment. In this context, experiments in which AI co-creates projects that straddle the line between the known and the speculative become interesting, such as parametric structures generated by GANs, which defy conventional typologies. However, to give them avant-garde significance, their formal distinctiveness is not enough, as they must bring a qualitative change to the understanding of space and its use. Therefore, AI creativity should be assessed not only through the prism of visual originality but also through its ability to initiate a critical dialogue with social and cultural realities.



Ill. 1. Two conceptual images visualizing the idea of “Artificial Intelligence and Postmodernity” through the lens of avant-garde architecture, source: Image generated by DALL-E 3 model via ChatGPT 4o for analysis on AI in architecture, 2025, <https://openai.com/dall-e>

In their manifesto, Vinchon and other researchers propose the following scenarios for creative collaboration between AI and humans<sup>9</sup>:

1. Co-creation with AI is a model of creativity in which humans and AI collaborate on equal terms. The results of such collaboration are often impossible for either party to achieve alone. A growing number of researchers and artists see this model as the future of creativity.
2. Confined creativity is creativity without AI. It can gain value as authentic and unique, similar to handcraft in times of mass production. Works created solely by humans may be perceived as more sincere and valuable.
3. Plagiarism 3.0 is the use of AI to impersonate creators without disclosing their sources. This raises legal and ethical controversies, especially in the case of AI-generated graphics, which are based on existing materials without the consent of their authors. This raises questions about copyright and intellectual property.

<sup>9</sup> F. Vinchon et al., *Artificial Intelligence & Creativity: A Manifesto for Collaboration*, “Journal of Creative Behavior” 2023, no. 4, pp. 472–484.

4. Creativity will decline when, faced with the power of generative AI, some people may lose their motivation to create. Instead of competing with the machine, they will outsource their creative tasks to it. This can lead to frustration, a sense of meaninglessness, a decline in self-confidence, and a lack of development.

These scenarios demonstrate the tension between technological progress and the value of human expression. Creativity is the ability to create new ideas or reinterpret existing ones, and its essence lies in innovation and originality. Generative AI, although capable of combining and transforming data, relies on what already exists, which can lead to a weakening of human creative abilities.

## 2.2. CREATIVITY AND THE DESIGN PROCESS

Architectural design is a complex process involving problem understanding, idea generation, analysis, evaluation, and evolution. Research indicates that design creativity utilizes a variety of symbolic systems, from vague and abstract to precise and specific<sup>10</sup>. Contemporary research on “hybrid intelligence” suggests that the most promising results can be achieved through symbiotic collaboration between humans and AI. AI can support the ideation process, accelerate prototyping, and automate repetitive tasks, but humans still play the primary role in design decision-making<sup>11</sup>.

What does AI think about this? The GPT-4o model answers the question of whether artificial intelligence, as a tool with enormous generative potential, can become a source of authentic, radical creativity and a contemporary avant-garde in architecture, as follows:

Yes, artificial intelligence, thanks to its generative capabilities, has the potential to become a tool for authentic and radical creativity in architecture. It enables the creation of forms and solutions previously difficult to imagine, transcending traditional design boundaries. It can support the development of the contemporary avant-garde by offering new formal languages, design strategies, and ways of thinking about space.<sup>12</sup>

The model then explains that although the generative process in artificial intelligence is often based on interpolation between patterns present in training data, which might suggest a limitation to the recombination of known forms, this does not exclude the possibility of authentic, radical creativity. The key is the appropriate use of AI as a creative partner, not merely a tool for automating the design process. The diversity and experimental nature of training sets, the use of more advanced methods such as evolutionary algorithms and reinforcement learning, and a creative approach to prompt engineering allow us to transcend the limits of typical interpolation. In this approach, artificial intelligence can become a source of unconventional formal and spatial solutions, supporting the development of contemporary avant-garde architecture.

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<sup>10</sup> V. Goel, *Creative brains: designing in the real world*, “Frontiers in Human Neuroscience” 2014, vol. 8. DOI: 10.3389/fnhum.2014.00241.

<sup>11</sup> P. Rupprecht, W. Mayrhofer, *op. cit.*

<sup>12</sup> OpenAI. Statement generated by the ChatGPT 4o model for the purpose of analysis on artificial intelligence in architecture, 2025, <https://openai.com/chatgpt>

### 2.3. CHALLENGES AND LIMITATIONS

In the context of contemporary architectural chaos, AI has the potential to play the role of a new structuralism, a system of rules and principles that could bring order to the design process. Instead of viewing AI as a threat to architectural identity, it can be viewed as a potential heir to the avant-garde, a creative partner capable of challenging norms and expanding the architectural imagination.

Research shows that AI can contribute to the development of new design methodologies that combine data analysis with design intuition. AI systems can also generate design rules and principles based on the analysis of existing architectural data.

The fundamental challenge is determining whether AI can transcend the limits of interpolation and achieve true innovation. While humans also draw on previous experiences, they possess the capacity for abstract thinking and intuitive approaches to problems. AI, operating on algorithms, may be limited to analyzing existing patterns without the possibility of transcending them. It is worth emphasizing that the historical avant-garde often utilized new technologies (from reinforced concrete and prefabrication to computer modeling) not to affirm them, but to push the boundaries of design. AI can play a similar role today, provided it is not treated solely as a tool for optimization or automation. Examples of AI-supported projects that draw inspiration from bionic forms or algorithmic structures demonstrate the potential for creating spaces that radically deviate from the norm. The key question is whether AI can become a medium of unpredictability, risk, and speculation – elements that were once hallmarks of the avant-garde.

Furthermore, the question of “soul” in architecture remains relevant. Contemporary architecture is often criticized for creating buildings “without soul,” spaces that lack connection to place and culture. Can AI contribute to solving this problem, or will it exacerbate it?

Considerations of AI in architecture lead to fundamental philosophical questions about the nature of creativity and innovation. If the avant-garde is defined as resistance to existing norms, then in a pluralistic world where “everything has already been done,” is it possible to define what to rebel against?

It is possible that AI could offer a new perspective: not as a tool for mimicking existing styles, but as a generator of new ways of thinking about space and form. AI systems can analyze patterns in ways that exceed human perception, potentially uncovering new relationships between form, function, and meaning.

### 3. CONCLUSION

The question of whether AI can create avant-garde architecture remains open. Although AI systems rely on existing training data, their ability to generate unexpected combinations and solutions has the potential to lead to true innovation. However, it is crucial to understand that avant-garde design is not merely about formal novelty, but rather about the ability to challenge fundamental assumptions about architecture and space.

Contemporary architectural design occurs in a tension between technological progress and the designer’s creative freedom. Advanced digital tools undoubtedly enable

the realization of complex forms and significantly accelerate the design process, but they can also lead to a situation in which creativity is reduced to the efficient use of software. As a result, the outcomes of working with AI more often reflect the capabilities of algorithms than the architect's individual vision. The conscious use of digital tools does not replace the creative process but can expand it. Artificial intelligence can become a design partner only when it serves not to reproduce known solutions but to explore new forms, narratives, and spaces. Maintaining a balance between technological efficiency and conceptual freedom is, therefore, crucial, both for the quality of architecture itself and for its meaning as a cultural practice.

In the era of Postmodernism, where the traditional concept of the avant-garde has lost its significance, AI could become a catalyst for a new form of architectural creativity, one that seeks not to break continuity with the past but to creatively reinterpret and synthesize it. The future of architecture may lie not in replacing human creativity with AI but in the development of hybrid forms of collaboration that leverage the strengths of both approaches.

Ultimately, whether AI can create avant-garde architecture depends on how we define the avant-garde in the 21st century. If the avant-garde is the ability to create new ways of thinking about space and place, then AI, in partnership with humans, could truly become the vehicle for this transformation.

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