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An analysis of spatial designs produced through mid-journey in relation to creativity standards

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Abstract

The purpose of this study is to comprehend how the artistic spaces developed by designer Hassan Ragab using Midjourney, one of the artificial intelligence technologies whose significance is growing every day, fit into the intersection of architecture and art. Using the random sampling method, six space modellings with three distinct forms and functions were selected for the study from the artistic spaces made by Hassan Ragab via Midjourney. People who have received or are undergoing design training were surveyed to analyze their perception of creative design principles in selected works. A total of 200 participants from two distinct design sub-professional groups were subjected to the research. According to the study, artificial intelligence offers a way for people without artistic ability to access art. Midjourney is an AI research lab with its own program and online platform that generates artwork from provided text. By using Midjourney, architectural designs can be turned into artistic works. Experts have found that most spatial designers have yet to try Midjourney and that the program has a significant impact on creative design principles like fluency, flexibility, elaboration, originality and freedom.

Keywords: artificial intelligence, art, architecture, midjourney, Hassan Ragab

1. Introduction

Thanks to modern technological advancements and mechanization, the world is now globalizing in a more comfortable and, at least partially, more automated direction. The cognitive and mental abilities of people are transferred to machines during this process, which leads to an increase in the amount of responsibility placed on machines (Yakar, 2020; Poole, MackWorth, Goebel & Randy, 2020). The most effective and notable technological advancement in the world today is artificial intelligence, whose significance is growing by the day. The use of artificial intelligence technology appears in various disciplines and all areas of life, such as economy, automobile, health, tourism, education, literature, agriculture, military, energy mining and engineering (Bayrak, 2022). The use of artificial intelligence has, indeed, become an influential force in the fields of art and architecture, taking on a prominent role in a new era (Çelenk & Kurak Açıcı, 2022). This era was brought about through a lengthy process that incorporated both hardware and software systems. The development of AI in architecture is categorized into four main areas: modularity, computational design, parametric design, and artificial intelligence. As per Chaillou, the use of AI in architecture is a natural progression and accumulation of prior concepts using relevant technologies (Hegazy & Saleh, 2023). The use of space as a form of art is increasing in contemporary works of art with the use of artificial intelligence, which also increases the interaction between art and architecture

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(Çelenk & Kurak Açıcı, 2022). A frequently occurring intersection has started to emerge where art and space interact. The similarities between architecture and art have grown in this context, and as a result of these processes, architecture has acquired new values through digitalization and artificial intelligence (Bayrak, 2022; Selçuk, 2022).

2. What is "Artificial Intelligence", the New Perception of Reality?

Because of the industrial revolution that occurred in Europe, the way that things are produced has changed, and the production of machines-which will have an impact on people for centuries-has taken center stage; so much so that mechanization is an area that is still increasing in importance today (Bayrak, 2022). Ardatürk (2022) characterizes the relationship between people and production change as a process of "machines accompanying people, people accompanying machines, software accompanying machines." This procedure changed into another model by the 20th century's end. It can be said that this new model, which we particularly encounter in the twenty-first century, has altered the industry's overall digitalization balance using a technique distinct from all earlier ones (Ardatürk, 2022). Artificial intelligence is the key component of this production innovation. Yang (2020) asserts that the ability of artificial intelligence to mimic human mental abilities in intricate operations across a range of applications makes it a revolutionary innovation (Bayrak, 2022).

Artificial intelligence is the simulation of human intelligence in machines or systems, as defined by Coşkun and Yetkin in 2002. These machines are capable of carrying out tasks and operations defined in their programming and can develop their abilities through the data they collect. Nils J. Nilsson, a prominent figure in the field, defines artificial intelligence as the incorporation of intelligence into machines (Nilsson, 2019). The development of artificial intelligence is expected to continue at a rapid pace and eventually surpass the limits of human intelligence. The defeat of Go Champion Lee Sedol by Google Deepmind's AlphaGo in 2016, four times in a row, and the defeat of World Chess Champion Garry Kasparov by IBM's Deep Blue artificial intelligence computer in 2015, were significant advancements in the field of artificial intelligence. These noteworthy developments have changed people's perceptions about AI (Kantürk, 2022; Bayrak, 2022; Ardatürk, 2022).

2.1. Relation of Space, Art and Artificial Intelligence

Numerous studies have examined the connection between space and art, and these two ideas have been characterized as universal and subsets of one another (Özsavaş Uluçay, 2017). Although both art and space are tools for communication and expression, their origins in distinct fields have kept them apart (Morkoç, 2013). Before modern art, artistic thought made use of the fictitious space; in contrast, in contemporary art, the art object transcends its boundaries and integrates with the space by making use of the space it is in (Arnold, 2010; Güler, 2014). Therefore, the understanding of contemporary art emphasizes the design process.

The art world has seen a major shift in recent years as digital production has become the primary means of creating contemporary art, rather than just a supplementary tool (Yüksel, 2014; Selçuk, 2022). Thanks to the abundance of software and applications available, many 21st-century artists are now incorporating artificial intelligence algorithms into their work. The rapid progress of computer technology has opened up new creative possibilities, allowing artists to explore new dimensions in their work with the help of artificial intelligence (Selçuk, 2022).

By utilizing sub-branches of artificial intelligence, such as machine learning and computational creativity, we can enhance our ability to identify and assess visual data and create new images by synthesizing. These applications can be used to categorize artists and their works based on their level of creativity, conduct aesthetic analysis, and evaluate artistic styles (Yakar, 2020).

Artificial intelligence technology is incredibly versatile in creating creative and artistic works. With deep learning, it can switch between various styles, comprehend facial expressions and body language, and even create images from text. It can add perspective and unique textures to line drawings, resulting in photorealistic outcomes. AI algorithms are constantly evolving and learning,

generating new versions and collecting data from online databases to enhance targeted works (Yakar, 2020).

Over the course of 30 years, an artificial intelligence by the name of AARON was directed by instructions modeled after those of a painter, and some of the paintings this program created were displayed in renowned museums around the globe. The ability of AARON to continuously learn and grow while painting is crucial in this regard (Bayrak 2022; Kantürk 2022). Deniz Yılmaz, an artificial intelligence created by Turkish designer and artist Bager Akbay, can also compose poetry (Cem, 2020; Bayrak 2022; Kantürk 2022).

The use of artificial intelligence in art has become increasingly important, providing artists with a way to create new works and broaden their experiences beyond their local surroundings. This integration of technology into art not only offers a modern interpretation of the art form but also acts as a helpful assistant to artists, as noted by Yakar (2020). Furthermore, Kayıhan (2021) highlighted the rise of digital art production, where algorithms are replacing the traditional role of the artist due to the effects of digitization.

2.2. Artificial Intelligence Effect in Architectural Space Setting

Architecture in the 21st century has intensified its focus on imaginative explorations of space, pushing design applications beyond human imagination (Çelenk & Kurak Açıcı, 2022). Space has become not only a material for designers but also a multidisciplinary workspace for discovering the invisible imaginary dimensions of space by designers, philosophers, and artists from various disciplines. Artificial intelligence is becoming more important in this context as it enables experiential applications. The unexplored possibilities and insurmountable boundaries in architecture have led to the emergence of different expression techniques and a new aesthetic understanding (Çelik, 2023). The partnership between designers and machines has enhanced the virtual reality space by broadening its horizons, as noted by Anadol (2020) and Çelenk and Açıcı (2022). This collaboration has impacted the relationship between buildings and individuals, and digitalization in architecture has transformed the limits and potential of space, facade, and materials (Anadol, 2020; Çelenk & Açıcı, 2022).

Midjourney is an exceptional example of how artificial intelligence can be utilized to enhance design practices in today's world. This intelligent technology can convert written texts into visual models with skilled artistic worth, and it is highly beneficial for design-oriented fields, particularly art and architecture (Domestika Blog, 2019). In 2022, a San Francisco company launched Midjourney as an extension of the chat server "Discord" (Salkowitz, 2022 cited in Radhakrishnan, 2023). Midjourney soon broadened its scope to include architecture, sculpture, art, and graphics. This artificial intelligence utilizes the "Prompt" text-to-illustration system. The "demand" letter, which includes a specific order and system to carry out this operation, is recognized by artificial intelligence (Panicker, 2022, cited in Radhakrishnan, 2023). This client-based AI art tool has generated a lot of debate, particularly in relation to architectural images (Radhakrishnan, 2023).

Midjourney is known for its extensive and varied capabilities. Firstly, it produces high-quality images that precisely depict the entered text. Secondly, it offers customization options that enable users to specify details to include or exclude from the images and adjust properties like color, style, and texture. Thirdly, the program is both speedy and scalable, delivering prompt results to input queries and featuring a straightforward interface with clear instructions. The Midjourney platform has the capacity to generate outputs. Unsupervised learning is the method used to train Midjourney, which enables machines to recognize patterns without human intervention. So, it can be said that Midjourney is a useful tool for tasks like testing design alternatives, visualizing design concepts, and creating research aids in the fields of architecture, design, and communication sciences (Turgay, et al., 2023).

Egyptian architect Hassan Ragab is a well-known artist and one of Midjourney's influential users and practitioners. He is regarded as a leading figure in computational architecture, a well-known

multidisciplinary designer, and a conceptual artist (Domestika Blog, 2019). In this area, Ragab has established a space at the intersection of art and architecture and creates works that address the region's future in architecture. The projects carried out using artificial intelligence can be viewed as an illustration of how architecture has changed in terms of aesthetics. The work related to Midjourney is more intense in the current time frame among the areas in which Ragab operates (Hsnrgb, 2019). Ragab displays architectural works in a digital environment using Midjourney, reflecting a fresh perspective on the future and reality free from material constraints. With his works handled with surreal and abstract concepts, he seeks to broaden his understanding of architecture in both real and virtual environments (Gazete, 2019).

Ragab examines iconic designs of extraordinary interiors in addition to his studies of conventional architecture and Islamic forms. While it frequently uses warm colors and shaded palettes in architectural and urban scale projects to reflect nature, it stands out with unusual materials, flowing textures, and vibrant color schemes in interior designs. The work of Ragab includes references to other architectural styles, well-known artists, architects, and works in addition to these key components. In his writings, he arranges these references. Ragab's artificial intelligence art combines representative Art Nouveau designs with deconstructive transitions of Zaha Hadid and fluid volumes of Spanish architect Antonio Gaudi to produce an original design approach (STIRworld, 2019).

Ragab emphasizes that the scope of Midjourney will go far beyond merely converting words into images; rather, it will develop over time to produce works that have practical applications. Ragab makes the following future prediction in this regard: "Robots will reference housing functions and connect with these visual forms through machine learning. Who knows? Perhaps models will be created on-demand, materials will be delivered by drones, and permissions will be managed by AI systems. We can't predict the future with certainty, but it will undoubtedly be interesting," hinted at potential outcomes (SceneNow, 2019).

Space is the start and the end of architecture, as is clear from the literature cited above. In this context, there are more similarities between architecture and art, and digitalization has given architecture new values. The purpose of this study is to comprehend the place of artistic spaces made with the Midjourney program, one of the increasingly significant artificial intelligence technologies, at the intersection of architecture and art. The works produced by internationally renowned designer Hassan Ragab using the Midjourney program will be examined for this purpose in terms of the geometric forms chosen within the parameters of the research. The study examines six different works in total that were created using three different geometrical forms-triangular, circular, and rectangular-as well as two different functions-facade and interior.

Studies on various creativity measurement tests have been carried out from the 1960s to the present. The creativity test created by E. Paul Torrance in 1966 stands out as the one that has been used the most in the literature in this situation. The ability to directly measure creativity makes this test particularly significant. According to Torrance, creativity is made up of four key components: fluency (the ability to generate a variety of ideas), flexibility, originality, and elaboration (Aslan, 2001). Torrance's Creative Thinking Test was used in this study because it has a broad scientific research foundation and is appropriate for the study's topic. Hassan Ragab's creative Midjourney outputs are evaluated using Torrance's parameters. The element of freedom is also considered in the evaluation along with these parameters. Below are the research hypotheses that were developed in this direction in accordance with the research's purpose and chosen research methodology.

H1: In the context of the principle of fluency, one of the creativity criteria, different geometric forms used in facade and interior designs made using the Midjourney artificial intelligence program have different effects.

H2: In the context of the flexibility principle, one of the creativity criteria, different geometric forms used in facade and interior designs produced by the Midjourney artificial intelligence program have different effects.

H3: In the context of the originality principle, one of the creativity criteria, different geometric forms used in facade and interior designs produced by the Midjourney artificial intelligence program have different effects.

H4: In the context of the elaboration principle, one of the creativity criteria, different geometric forms used in facade and interior designs produced by the Midjourney artificial intelligence program have different effects.

H5: In the context of the freedom from creativity criteria, various geometric forms used in façade and interior designs produced by the artificial intelligence program Midjourney have varying outcomes.

3. Research Method

In order to test the research hypotheses developed in accordance with the study's objectives, information about the research model, universe, sample group, data collection tools, experimental environment design, and analysis process is provided in this section of the study.

3.1. Research Model

The general purpose of this research is to determine the position of artistic spaces created by designer Hassan Ragab using Midjourney, one of the artificial intelligence technologies whose importance is increasing day by day, in the intersection of architecture and art. It was questioned whether the facade and interior designs made using various geometric forms through Midjourney significantly differed from the creativity criteria within the context of the study. To test the created research hypotheses in this direction, the study was structured per the relational screening model, one of the general screening models.

3.2. Research Population and Sample

The research sample consists of individuals who have pursued or are currently pursuing education in any of the design disciplines. The survey was conducted using random sampling methodology and included 200 designers who have received or are currently receiving design education.

3.3. Data collection tool

The study's data collection method was a questionnaire. The parameters of the Torrance Creative Thinking Test, which were discovered to be valid and reliable in studies conducted by Torrance (1966), were used during the design phase of this questionnaire. The three (3) part questionnaire was submitted online between July and August 2023. The questionnaire is divided into three sections: the first asks about the participants' demographics; the second gauges their knowledge of Midjourney artificial intelligence and creativity; and the third meters their interest in the facade and interior designs made using various geometric forms according to Midjourney and creativity criteria.

3.4. Creation of the Experimental Setting

As an experimental environment, Hassan Ragab's triangular, circular, and rectangular artistic interiors and facades created with the aid of Midjourney artificial intelligence were used in this study. Using the random sampling method, a total of six space models from the artistic spaces developed by Hassan Ragab using Midjourney artificial intelligence were chosen for the study. These models had three different forms and two different functions. Figure 1 illustrates how the experimental environment was preferred to be the perspectives of the chosen facade and interior spaces with three different geometric forms.

Figure 1 Facade and Interior Perspectives Designed by Hassan Ragab Using MidJourney Artificial Intelligence (Ragab, 2023).

3.5. Data Analysis

The necessary statistical analysis was performed on the data using the SPSS 22.0 package program after they had been collected using the measurement tools. Before beginning the statistical analysis for the study, demographic variables were grouped. After that, the survey participants' responses to the scales' items were scored using a 5-point Likert scale. The distribution within the groups was first examined during the data analysis, and the Single Sample Kolmogorov-Smirnov (K-S) Test was used to determine whether the data from the research scale fit the particular distribution (Baştürk, 2010). As a result of the analysis, it was determined that the data obtained from the research scale showed normal distribution ($p>0,05$). To verbally express the numerically calculated means of the dimensions related to the descriptive statistics methods (5-1=4; 4:5=0.80), mean weight values were then calculated. According to Günaydın and Dalkıran (2021), the interval values are as follows: 1.00-1.80 for Strongly Disagree-Low; 1.81-2.60 for Disagree-Below Intermediate; 2.61-3.40 for Undecided-Intermediate; 3.41-4.20 for Agree-Above Intermediate; and 4.21-5.00 for Strongly Agree-High.

4. Research Findings

The research data obtained through Midjourney was tested with suitable statistical methods in order to determine the difference between the facade and interior designs created using different geometric forms and the creativity criteria, and the research findings are given below in a systematic order.

4.1. Reliability Analysis

The Cronbach alpha reliability coefficient was looked at in the reliability analysis of the scale used within the parameters of the study. According to earlier research by Cronbach (1951), Panayides (2013), and Müezzinoğlu (2020, 2021), a scale is deemed to be highly reliable if its alpha coefficient is between 0.80 and 1.00. According to this standard, the scale included in the study's scope had an internal consistency coefficient of Cronbach Alpha of 0.960. In this situation, it is possible to state that the study's scale is very trustworthy.

4.2. Demographic Characteristics of Survey Participants

The study involves 200 participants, with 73.5% of them being female and 26.5% being male, as indicated in Table 1. It is believed that half of those with design education have completed their undergraduate degrees.

Table 1 Demographic characteristics

Variables		f	%
Gender	Female	147	73.5
	Male	53	26.5
	Total	200	100
Trained in design	Graduate	100	50
	Student	100	50
	Total	200	100
Name of department studied	Interior Architecture / Interior Architecture and Environmental Design	118	59
	Architecture	82	41
	Total	200	100

Note: f: Frequency Number, %: Percent Value

4.3. Findings on Midjourney Artificial Intelligence and Creative Design

Table 2 displays the frequency numbers and percentages of the participants' responses to the queries intended to gauge their level of familiarity with Midjourney.

Table 2 General evaluations about Midjourney

Evaluations of Midjourney artificial intelligence	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree		Total
	f	%	f	%	f	%	f	%	f	%	-
Question 1	16	8	12	6	24	12	113	56.5	35	17.5	200
Question 2	10	5	7	3.5	65	32.5	95	47.5	23	11.5	200
Question 3	17	8.5	17	8.5	35	17.5	92	46	39	19.5	200
Question 4	12	6	25	12.5	50	25	80	40	33	16.5	200
Question 5	72	36	62	31	23	11.5	34	17	9	4.5	200

Note: f: Frequency Number, %: Percent Value

According to the survey results, 56.5% of respondents agreed with the statement in Question 1 that artificial intelligence allows individuals without artistic abilities to access art. For Question 2, 47.5% of participants agreed that Midjourney, a research lab, has developed its own AI program. In Question 3, 46% of respondents agreed that Midjourney's online platform produces art based on text entered into the software. For Question 4, 40% of those surveyed agreed that using Midjourney can transform an architectural design into an artistic work. In Question 5, 36% of participants strongly disagreed with the statement that they have used the Midjourney platform multiple times to create spatial designs. Based on these findings, it appears that designers have some understanding of the benefits and drawbacks of Midjourney, but they haven't used it extensively in the design process.

Table 3 shows the frequency distributions and percentages of participants' responses regarding their understanding of the effects of Midjourney AI on creative design.

Table 3 Evaluation of the effects of the Midjourney artificial intelligence program on creative design

Evaluations on Creative Design Principles		f	%
What are the effects of using Midjourney's artificial intelligence program on creative design?	Fluency (generating lots of ideas)	153	31.9
	Flexibility	88	18.3
	Originality	70	14.6
	Elaboration	102	21.3
	Freedom	67	14

Note: f: Frequency Number, %: Percent Value

According to the responses from Table 3, the Midjourney artificial intelligence program has a significant impact on creative design principles. The majority of respondents noted that the program's fluency (31.9%), elaboration (21.3%), flexibility (18.3%), originality (14.6%), and freedom (14%) have assisted in making more accurate and creative decisions. This is due to the program's ability to process data and information faster than humans.

4.4. Evaluations of Creative Design Principles

At this point in the study, statistical techniques were used to compare participant evaluations of the parameters of the Torrance Creative Thinking Test, which were discovered to be valid and reliable in studies conducted by Torrance (1966).

Using statistical techniques, the architectural designs of the research participants were compared and contrasted with the fluency principle, which is one of the parameters of the Torrance Creative Thinking Test. Table 4 presents the mean and standard deviation values of the data, along with the results of the single-factor analysis of the variance test.

Table 4 Single-factor analysis of variance of the fluency principle

Fluency Principle	N	M	SD	DoF	F	P
Space - 1	200	3.87	0.960	5.195	1.434	0.209
Space - 2	200	3.78	1.047			
Space - 3	200	3.71	1.105			
Space - 4	200	3.74	1.099			
Space - 5	200	3.91	1.052			
Space - 6	200	3.68	1.115			

Note: N: Number of samples, M: Mean, SD: Standard deviation, DoF*: Degree of Freedom, F: F value, P: Significance value*

The Single Factor Analysis of Variance results show that there are no statistically significant differences between participant perspectives on the fluency principle, one of the creativity criteria for the various geometric forms used in facade and interior designs developed using Midjourney, according to the spaces (F(5.199)=0.209, p>05). To put it another way, there is no distinction between the concepts of fluency and spatial designs. The H1 hypothesis cannot be backed up by this result. This outcome demonstrates that, generally speaking, the principle of fluency does not reveal a glaring difference in the application of various geometric forms.

In a different analysis, statistical techniques were used to examine the discrepancies between the participants' assessments of architectural designs and the flexibility principle of the Torrance Creative Thinking Test parameters. The results of the single-factor analysis of variance, the Tukey test, and the analysis's mean and standard deviation are shown in Tables 5 and 6.

Table 5 Single-factor analysis of variance of the flexibility principle

Flexibility Principle	N	M	SD	DoF	F	P
Space - 1	200	3.69	1.010	5.195	5.621	0.000
Space - 2	200	3.87	1.019			
Space - 3	200	3.50	1.165			
Space - 4	200	3.49	1.160			

Space - 5	200	3.86	1.049			
Space - 6	200	3.49	1.125			

Note: N: Number of samples, M: Mean, SD: Standard deviation, DoF: Degree of Freedom, F: F value, P: Significance value

The flexibility principle, one of the creativity criteria of various geometric forms used in the facade and interior designs created using Midjourney, is one where the perspectives of the participants differ significantly, as shown by the results of the Single Factor Analysis of Variance (F(5.199)=0.000, p<05). In other words, their perspectives on the flexibility principle in relation to spatial designs differ. The H2 hypothesis is supported by this finding.

Table 6 Multiple Comparison Tukey Test Results

Evaluation	Space - 1	Space - 2	Space - 3	Space - 4	Space - 5	Space - 6
Space - 1						
Space - 2			x	x		x
Space - 3		x			x	
Space - 4		x			x	
Space - 5			x	x		x
Space - 6		x			x	

Note: X: Multiple Comparison Tukey Test Results

Table 6's multiple comparison Tukey test results illustrate which two groups the differences originate from, and it was found that Space-2 (M=3.87; SD=1.019) was the most flexible space.

In a different analysis, statistical techniques were used to compare how participants rated the parameters of the Torrance Creative Thinking Test in terms of the principle of originality. Tables 7 and 8 provide the data's mean and standard deviation values as well as the results of the single-factor analysis of variance and the Tukey test.

Table 7 Single factor analysis of variance of the originality principle

Originality Principle	N	M	SD	DoF	F	P
Space - 1	200	3.80	0.987	5.195	4.937	0.000
Space - 2	200	3.88	1.015			
Space - 3	200	3.77	1.026			
Space - 4	200	3.50	1.143			
Space - 5	200	3.94	1.016			
Space - 6	200	3.64	1.032			

Note: N: Number of samples, M: Mean, SD: Standard deviation, DoF: Degree of Freedom, F: F value, P: Significance value

The originality principle, one of the creativity criteria of various geometric forms used in the facade and interior designs created using Midjourney, is one where the perspectives of the participants differ significantly, as shown by the results of the Single Factor Analysis of Variance (F(5.199)=0.000, p<05). In other words, the concepts of originality vary depending on the layout of the space. The H3 hypothesis is supported by this finding.

Table 8 Multiple Comparison Tukey Test Results

Evaluation	Space - 1	Space - 2	Space - 3	Space - 4	Space - 5	Space - 6
Space - 1				x		
Space - 2				x		
Space - 3						
Space - 4	x	x			x	x
Space - 5				x		
Space - 6					x	

Note: X: Multiple Comparison Tukey Test Results

Space-4 (M=3.50; SD=1.143) was identified as the least unique space after taking into account the multiple comparison Tukey test results shown in Table 8, showing which two groups the differences originate from.

In a different analysis, statistical techniques were used to examine the discrepancies in the participants' assessments of the elaboration principle. Tables 9 and 10 provide the mean and standard deviation values of the data obtained from the analyses, results of the single factor analysis of variance, and the Tukey test.

Table 9 Single factor analysis of variance of the elaboration principle

Elaboration Principle	N	M	SD	DoF	F	P
Space - 1	200	3.71	1.060	5.195	2.635	0.022
Space - 2	200	3.55	1.129			
Space - 3	200	3.88	1.082			
Space - 4	200	3.71	1.164			
Space - 5	200	3.86	1.066			
Space - 6	200	3.67	1.067			

Note: N: Number of samples, M: Mean, SD: Standard deviation, DoF*: Degree of Freedom, F: F value, P: Significance value*

A significant difference exists between the perspectives of the participants regarding the elaboration principle, one of the creativity criteria of various geometric forms used in facade and interior designs created using Midjourney, according to the spaces, as shown by the results of the Single Factor Analysis of Variance ($F(5.199)=0.022$, $p<05$). In other words, there are various detailing concepts depending on the space designs. The H4 hypothesis is supported by this finding.

Table 10 Multiple Comparison Tukey Test Results

Evaluation	Space - 1	Space - 2	Space - 3	Space - 4	Space - 5	Space - 6
Space - 1						
Space - 2			x		x	
Space - 3		x				
Space - 4						
Space - 5		x				
Space - 6						

Note: X: Multiple Comparison Tukey Test Results

Table 10's results of the multiple comparison Tukey test identify Space-3 (M=3.88; SD=1.082) and Space-5 (M=3.86; SD=1.066) as the two spaces with the greatest level of detail.

In a different analysis, statistical techniques were used to examine the discrepancies in the participants' assessments of the principle of freedom. Tables 11 and 12 provide the mean and standard deviation values of the data obtained from the analyses, single factor analysis of variance, and results of the Tukey test.

Table 11 Single factor analysis of variance of the freedom principle

Freedom Principle	N	M	SD	DoF	F	P
Space - 1	200	3.79	1.036	5.195	4.042	0.001
Space - 2	200	3.93	1.022			
Space - 3	200	3.81	1.031			
Space - 4	200	3.61	1.120			
Space - 5	200	3.99	1.005			
Space - 6	200	3.65	1.050			

Note: N: Number of samples, M: Mean, SD: Standard deviation, DoF: Degree of Freedom, F: F value, P: Significance value

The freedom principle, one of the creativity criteria of various geometric forms used in the facade and interior designs made using Midjourney, is one where the perspectives of the participants differ significantly, as shown by the results of the Single Factor Analysis of Variance ($F(5.199)=0.001$, $p<05$). In other words, different concepts of freedom exist depending on the layout of a space. The H5 hypothesis is supported by this finding.

Table 12 Multiple Comparison Tukey Test Results

Evaluation	Space - 1	Space - 2	Space - 3	Space - 4	Space - 5	Space - 6
Space - 1						
Space - 2				x		
Space - 3						
Space - 4		x			x	
Space - 5				x		x
Space - 6					x	

Note: X: Multiple Comparison Tukey Test Results

Space-5 (M=3.99; SD=1.005) is regarded as the freest space, while Space-4 (M=3.61) was assessed as the most unfree, as can be seen in Table 12 when the results of the multiple comparison Tukey test show which two groups the differences originate from.

5. Conclusion and Recommendations

The primary focus of this study has been on determining whether there are any appreciable differences between the facade and interior designs produced using various geometric forms using Midjourney and the creativity criteria. Its goal is to provide direction to designers and users so that they can design.

Through the evaluation of creative design principles, it was discovered that there are four significant results for architectural spaces and Creative Thinking parameters. It was found that, apart from fluency, the principles of flexibility, originality, elaboration, and freedom are perceived and evaluated more positively in terms of facade and interior design. The geometric shapes used in the facade and interior designs created by Midjourney have no noticeable impact on the fluency principle. Therefore, it can be concluded that the designs are successful in incorporating these principles effectively.

The study discovered that people had varying perceptions of the facade and interiors of buildings with different geometric shapes, depending on how the flexibility principle was applied. The results showed that Space-2, which had a circular shape, was considered the most flexible based on the averages. The second most flexible space was Space-5, which also had a circular form. This finding suggests that circular designs are generally viewed more positively when considering the flexibility principle. This supports the findings of previous studies by Yılmaz (2004) and Watson et al. (2012).

Another finding showed that the perceptual assessments of facades and interior spaces with various geometric forms varied depending on assessments of the principle of originality. Accordingly, when we look at the averages, we can see that Space-5, which belongs to the circular-form interior perspective, is the most original space, and Space-4, where triangular forms are frequently used, is the least original space. This finding demonstrates that designs with circular geometric forms are viewed more favorably when viewed in the context of the originality principle. This finding confirms the findings of earlier studies by (Yıldırım et al. 2021; Çırak et al. 2021; Aydın 2021; Yılmaz 2004).

In a different finding, it was established that there are differences between the perceptual assessments of facades and interiors with various geometric forms according to the assessments of the elaboration principle. As a result, it can be seen from the averages that Space-3, which has a rectangular shape and belongs to the facade perspective, is the most elaborate space. This finding indicates that, when considering the elaboration principle, designs with rectangular geometric forms on the facades are viewed more favorably. This finding confirms the findings of studies by Çırak et al. (2021) and Yılmaz (2004).

Another finding found that there were variances in the perceptual evaluations of facades and interiors with various geometric forms based on assessments of the freedom principle. Accordingly,

it can be seen from the averages that Space-5, which belongs to the interior perspective with a circular form, has the freest space, while Space-4, where triangular forms are used the least, has the least free space. This finding demonstrates that designs with circular geometric forms are viewed more favorably when viewed in the context of the freedom principle. This finding confirms the findings of the studies conducted by (Yıldırım et al. 2021; Çırak et al. 2021; Aydın 2021; Yılmaz 2004).

This research showcases how artificial intelligence can bring art within reach of those who lack natural artistic abilities. Midjourney is a research lab that has developed its own AI program, which operates as an online platform creating art from given text. It could be argued that Midjourney could transform architectural designs into works of art. However, it has been found that most designers have yet to utilize Midjourney in their spatial design creation. The research also indicates that the creative criteria and facade designs produced by Midjourney's AI program, using various geometric forms, can be useful tools for spatial evaluations.

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