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THE IMPACT OF ARTIFICIAL INTELLIGENCE ON ARCHITECTURAL REPRESENTATION, WITH A FOCUS ON CULTURAL AND SEMANTIC ASPECTS

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Abstract. The rapid development of artificial intelligence (AI) technology has impacted art, architecture and design. AI has the potential to change architectural education by replacing traditional or CAD drawing tools and techniques with knowledge of terminology and words since they are text-to-image machines. Demonstrating architectural design requires understanding architectural history, theory, materials and techniques to describe it to the robot. Ultimately, AI design involves creating a systematic text structure with comprehensively chosen words and their order to illustrate architecture with meaningful words rather than drawings. Therefore, semiotics and semantics are crucial in creating and demonstrating prescribed texted space on AI platforms. The research focuses on applying theoretical knowledge of semiotics to architectural design using AI robots. The study involved comparing the use of Turkish and English languages and assessing the ability of AI robots to understand and illustrate architectural designs to see how language also affects the AI design process. It aims to explore how AI's use in architecture impacts design by using potential implications of emphasising cultural, traditional and linguistic aspects of architecture to contribute to the development of AI in architectural design and education.

Keywords: *Architectural semiotics, artificial intelligence, writing architecture, theory and criticism.*

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1. Introduction

The rapid development of artificial intelligence technology can now impact art architecture and the design environment. There are numerous online platforms like DALL-E, Midjourney, Playground and Runway ML, where anyone can produce visuals of architectural and urban spaces shaped and formed by their creativity. In the past, architectural education was crucial to representing the mathematical space of drawings or 3D modelling; therefore, knowledge of drawing and illustrating the architectural space was essential to architectural education (Enjellina *et al.*, 2023). However, AI robots erased the receipt of this knowledge of drawing techniques by replacing them with writing abilities to describe the imagined space to the robots who are volunteers to form and render this pre-imaged description. This development raised the question of what AI can be part of architectural education and what tools are necessary to use and control it successfully. As AI works with text-to-image robots, drawing palettes of CAD programmes leaves their place to language and grammar. Robots decode the meaning of

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words (semiotics) according to the order of words (semantic); using language is crucial to creating and demonstrating prescribed space in the AI platform (Campo, 2022). Ultimately, the knowledge of semiotics and semantics shakes the central role of drawing with pens and lines of computer-aided programs by replacing them with drawings with words and text. Semantic means order of letters and text, while semiotics comes from the French word "semiology" and the Greek word "semeion", meaning sign (Saussure, 2013). It deals with meaning, signification and the production of meaning beyond the scientific examination of signs (Rifat, 2019). Even though the importance of semantics and semiotics seems to increase using AI, these tools have always been essential for architecture because architectural designs should be meaningful and cannot be considered independent of their function, material, structure and environment.

Architecture is the act of ensuring that the idea and function are transformed into a meaningful form. This meaningful form turns architecture into a sign and the relationship between form and function makes architecture attractive to semiologists (Eco, 2019). The foundations of Contemporary Semiotics were laid by Charles Sanders Pierce (American logician) and Ferdinand de Saussure (Swiss linguist), who inspired many linguists and researchers who followed them. Umberto Eco was influenced by Peirce, who gave meaning to architecture by interpreting non-linguistic objects (symbol-sign). At the same time, Roland Barthes was inspired by Saussure to reduce architecture to language (grammar-word) with a semiotic approach (Rifat, 2019). Architecture should be viewed and interpreted as a visual (extralinguistic element) like Peirce and as a linguistic object (consisting of words) like Saussure thinks; thus, AI robots generate space through this potential. Subsequently, architectural semiotics means interpreting architecture via its signs with linguistic explanations of its visual, historical, physical and abstract references.

Defining architectural space needs specific terminology, so it is still crucial to know the architectural history, theory, materials and techniques to correctly send the prompts to the robot to indicate precisely what is architecturally imagined. However, the world of architecture is vast and full of numerous cultural and traditional techniques that nationally or geographically change along with their languages. Since there is no one mutual language in the world, these styles and methods can be vernacular, so they may not be translated into English or sometimes their name also changes according to their dialect. Even though AI robots are still developing, their reaction to the various languages and words, except English, can not be monitored or controlled. Therefore, language, specifically English literature and the ability to use it are crucial and mandatory elements of architectural design in AI in the 21st century; however, it is not enough unless they don't know the architectural terminology, history, theory and technical details. Ultimately, AI architectural design is not just a simple conversation with robots. Instead, it is designing a systematic text structure with comprehensively chosen words and their order; instead of drawing a *plan* and *section*, writing it as a text or prompt means illustrating architecture with meaningful words rather than drawings.

Nevertheless, language and the ability to use language to describe a space in architecture have always been important since architecture is not only an action of designing or illustrating a space or a talent for drawing. One of the most famous tutors and architects of Bauhaus, Walter Gropius, is notoriously known for not being good at drawing and sketching, so he described his imaginative space by dictating the complex materials, structures and techniques to his colleagues in Peter Behrens office to make them draw what he imagined (Krohn, 2019). Not to mention that Gropius and his knowledge of history, material, terminology and vision enabled other designers to

understand what was dictated and they illustrated what Gropius had in his mind. What AI robots do today is very similar to what Gropius's collaborators did; they received the space definition and registered it, then illustrated the space as a response. This process allows anyone to demonstrate a space; however, results can differ depending on language and knowledge because, similar to the case of Gropius showing that, drawing well does not make someone an architect since the spatial design needs creativity, aesthetics, material and movement in the space by considering restrictions like rules and regulations must be considered by the commander of the space. It is essential to know how to master and control AI by taking linguistics and language as a design palette.

Mark Foster Sage applied AI robots to explore patterns and figures, mainly natural figures, geometries and Arabic letters, in traditional architecture at the UNESCO heritage site of Mada'in Salih (Sage, 2022). He digitalised them with robots and reproduced them in new 3D print versions. Since robots do not understand and work with Arabic language and letters, they take them as abstract, repetitive forms and creatively interpret and reproduce them as a pattern. From Baran Studio Architecture, Baran (2023) discovered that even though some words related to violence, like blood and gore, are banned from being used in AI, they are still usable. Manipulating these words by describing them without naming them makes it possible to get the result of blood and gore as in their illustration, 'meat machine' (Figure 1).

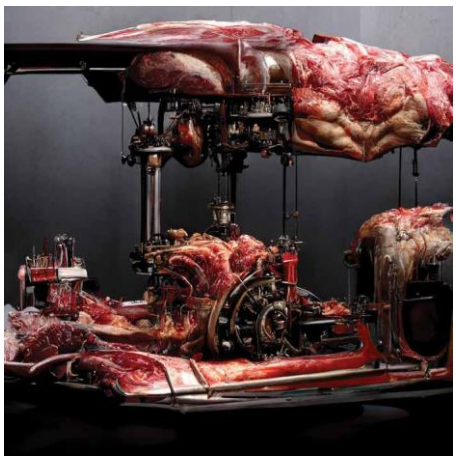


Figure 1. Meat Machine by Baran Studio
Source: Jacobus & Kelly, 2023

This gap makes using AI vulnerable and manipulative since it cannot quickly evaluate the ethics of the result. As AI robots are open to anyone and text-based robots, language is the only way to communicate with them. Therefore, language can be advantageous and weak at the same time; hence, to develop robots and fill this gap, more research should be carried out on language and linguistics. Considering the central role of language in AI design, this research aims to explore the impact of AI on architectural design in terms of the advantages and weaknesses of languages. It is essential to note that each language has its own rules and typology shaped and fertilised by its culture and heritage. Therefore, it is essential to perform with AI using different languages to see its strengths and weaknesses while representing the architectural design process.

AI as a rapid technological tool can be part of the architectural education system since it has potential; however, language weaknesses should be tested to contribute to its development. This research was generated by a curiosity about how robots respond to

different languages with their structure and dialects, as the author's first language is Turkish. It is intended to test robots with architectural students who have no previous knowledge about AI robots but know architectural terminology and have the Turkish language as their mother tongue to see the process and progress of this first conversation between students and robots. As previously stated, AI platforms like Midjourney, Runway ML and DALL-E employ cutting-edge algorithms to generate images from textual descriptions. While robots process images according to text, the order of the words (semantics) and the definition of space are carefully chosen and demonstrated with words (semiotics). Since the Turkish language has its grammar, dialects and rules, evaluating and negotiating with robots is essential to see how they respond to Turkish expressions and words. By creating a dialogue between a group of Turkish architecture students and robots, this research intends to detect the strengths or weaknesses of text-based design in AI, as it is a promising design tool that should be developed and be part of architectural education.

2. Material and Methods

This research pertains to performing research, which involves searching for information, studying, or analysing data as part of a project or assignment that integrates theory and practice. Since AI robots can be practised on online platforms, research is based on practising robots with architecture students. Architecture (capacity of the studios) students from the author's affiliation university were invited to the workshop. Since expressing the architectural terminology related to structure, material, complex systems or various styles along with theoretical knowledge, students were chosen among senior students who had successfully completed the history of architecture courses but never experienced AI or practised semiotics. Among them, only twenty students met these criteria. They became groups of two so that they could negotiate and check one another's sentences or make contributions and then each group created an account to perform with Playground AI. It is a free platform and easy to use for beginners; however, each account can make up to twenty images for free. This restriction determines how many times they will send a prompt to robots. Before starting this process, all studios agreed to send five prompts and ask for four images for each prompt to compare how the robot responds to the same prompt in four images. At the beginning of their first dialogue with the robot, all students were encouraged to imagine a city as a group and write down a description of this city. Then, they were asked to create a mood board using free online images to illustrate their imagined city. Since each group has two people, each student is expected to have their imaginative city, which can resemble one another but can not be identical. Also, it is essential to see how closely robots can create a space resembling human imagination. After that, each group sent their prompt in Turkish and English to get the result.

Understanding how language and text function within this framework requires examining both the semiotic structure of signs and the semantic layers of meaning. Peirce and Saussure both were known as established semiotics but emphasised different aspects of them. Peirce focused on the logical function of signs, while Saussure was more interested in their social function. Although their systems are similar, Peirce divided the sign into two parts - the object and the interpreter - while Saussure referred to the sign as a signifier (Boon, 1982). Peirce believed that people speaking the same language would interpret a signifier in the same way, represented by a straight line called the plane of the

sign. For example, a Turkish speaker with an image of a cave would use the word “cave” to make sense of it. Lefebvre (1991) once said that “every society produces its own space”, meaning that every architectural object a society produces is a social indicator corresponding to its functional needs. To create architecture, a functional need is transformed into a sign with a design idea defining the space phase through linguistic and visual codes. This is why architecture students are taught to combine Peirce's linguistic and Saussure's visual sign systems to structure their text as architectural semiotics. In the following step, students were taught the theoretical background of semiotics of both philosophers. Students were encouraged to read Roland Barthes's The Eiffel Tower and Other Mythologies (1979) and Umberto Eco's Semiotics of Architecture (2019) to understand how semiotics can be applied and interpret architecture. Then, they re-described their imagined city in as much detail as possible and they gradually semiotically developed their definition of their city by text to explore how the linguistically improved text changes the result in two languages.

As the student's mother tongue is Turkish, but the language of the robots is English, this process was repeated five times in both Turkish and English to compare how language (Turkish and English) and structurally and semiotically developed expressions affect the result. Since architectural terminology can differ from culture to culture, testing robots to determine whether they can predict and illustrate the meaning of Turkish terminology or local expressions is crucial. Then, each definition was sent to robots to see how the robots reacted, responded and illustrated images according to different languages and vocabulary richness. In this research, only four groups work were chosen to discuss how successful robots understand and illustrate architectural design because of the word limitation of this essay. The results were evaluated and assessed based on the student's subjective answers since the image they wanted to illustrate was in their minds. Since the history of architecture is full of different rules and orders that change according to eras and styles, there is no specific frame to describe *good, bad* or *ugly* architecture. Palladio's beauty (2013) of the building was based on the mathematical relationship among the parts of the building that create forms, while a good architecture for Corbusier (1986), who measured space's beauty and aesthetic by his five rules. Rohe and Blaser (1986) described his design criteria as timeless design and expressed his ideology with '*less is more'* as opposed to Venturi's '*less is a bore'* (1977), showing that the success of architecture is subjective. Nonetheless, this study needed some restrictions to assess the results and find common ground among different student groups by considering the strengths and weaknesses of robots responding to language. Considering the architects above, good architecture should include their elements (criteria) or orders; in this case, *good* or successful results in AI should correspond to the text or visualise what was written.

On the other hand, *bad* architecture is a design that does not include obligatory elements in AI design cases. These illustrations do not correspond to the text or do not represent what was written to the robot to illustrate. Therefore, the objective assessment of the results will be based on whether the robot illustrated the text or if the result is irrelevant to the text. Thus, results that stand for the text will be marked as *good* and successful and results that do not present the elements in the text will be marked as *bad* and unsuccessful.

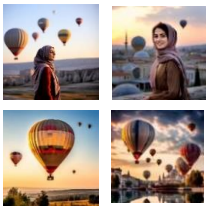
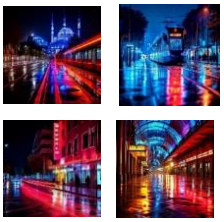
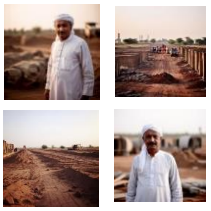
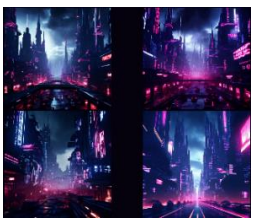
Finally, while communicating with robots, all the ethical considerations were considered, like the choice of language that excludes violence, nudity, body parts and politics. Prompts were designated by excluding words related to them.

3. Writing Architecture and Cities as Text

The research process began by asking students to imagine one city and chat with their pairs to agree on one mutual city together. Afterwards, they briefly made a short speech describing their cities to other groups and were asked to transfer this speech to the paper. Initially, students were given no restrictions, orientation or directions to provide them with complete freedom to see how they put their imaginative space into words. After describing this imaginary space in their own words, they were asked to create their own visual data set individually to explain how they imagined it in their minds. Table 1 shows that each student has a different data set for the same descriptions. It is to explore whether robots will create an image similar to these data sets or look like what students imagined. Then, they translated the exact Turkish definition of the space and sent the same definition in two languages as text prompts to the Playground AI. Table 1 also shows how AI responded to the first Turkish and English definitions of their imaginary places. After the first AI design space visual set that was based on the first Turkish-English definitions, the students were gathered to be taught semiotics and semantics to help them enrich the language of their prompt as much as the textual expression of their cities.

Table 1. Writing cities as a text practice of student groups

Case Study	Group 1	Group 2	Group 3	Group 4
Turkish Definition of A City	Uzayda baloncuğun içinde sular altında kalmış bir kent. Teknolojinin çok geliştiği bir şehir. Tüm binalar modern kapsüllerden oluşuyor.	Bataklığın ortasında kalmış adalardan oluşan bir kent.	Gökyüzü ölümcül bir karanlığa bürünmüştür, dumanla kaplı bir atmosferin altında, fütüristik bir şehir vardır. Neon ışıklı devasa tabelaların olduğu bu metropol, beton ve çelikten bir labirent gibi yükselmektedir.	İnsanların betondan bir zeminden yürürken aniden betonun suya dönüştüğü bir ortam.
Data set 1: What student 1 imagined and blended in their minds	 Life underwater  space like this  Capsules like these	 The Castle  Transparency  Colourful huge plants	 Skyscrapers  Advertisement  Megastructure	 Water and ice  The lava island  Iceberg among clouds

Data set 2: What students 2 imagined and blended in their mind	 Life underwater  Space like this  Capsules like these	 The Castle Transparency  Colourful huge plants 	 Skyscrapers  Advertisement signs  Megastructure	 Water and ice  The lava island  Iceberg among clouds
AI responses To Turkish 1st Prompts in Playground			 *	
English Definition of A City	A city submerged in a bubble in space. It is a city where technology is very developed. All buildings consist of modern capsules.	A city consisting of islands stuck in the Middle of a swamp.	The sky has become deadly dark and under a smoke-covered atmosphere, there is a futuristic city. This metropolis, with huge neon signs, rises like a maze of concrete and steel.	An environment where people walk across a concrete floor and suddenly the concrete turns into water.
AI responses to 1st English Prompts in Playground				

4. Introduction to Architectural Semiotics

Text-to-image robots use NLP (Natural Language Processing) and Neural Networks to illustrate the image through the prompts. NLP focuses on the interaction between human language and computers, enabling machines to think like humans, interpret and respond to language with images according to the order of words. Robots also apply Deep Learning, which includes neural networks that can learn complex patterns in large amounts of data in a short time (Elasri *et al*., 2022). Therefore, processing AI production is a creative performance between the human subject and a robot object; they playfully exchange the architect's role since it is never clear that the actual designer is the tool because many other tools and programs are involved in the process. When a user inputs a textual description into robots, the text acts as a sign or code that needs to be interpreted by the AI to generate a corresponding visual representation. The AI processes the text to understand the underlying concept and then translates that concept into an image. This deciphering process of the robots means decoding the semiotics and the semantics of the text (Campo, 2022).

Robots take each input as a signifier that signifies or stands for an image in AI's library since cloud technologies store all photos according to their names and tags. Upon executing the command, the artificial networks promptly retrieve relevant images from extensive data or datasets in their specialised libraries. Next, the networks generate a new image by blending the pixels according to the standard characteristics of these images. As this semantic creation displayed in the chat box represents what is intended to be depicted in the design to be created, the resulting image space represents the construction process of the system of the sign. Therefore, the relationship between input and output depends on the relation between the signifier (what the user texted) and signified (what the robot understood and called from its library).

– **Signifier:** The text input provided by the user. This text serves as the form or medium through which the user's intent is communicated to the AI. It was tested before students were taught semiotics, as in Table 1.

– **Signified:** The conceptual image or idea the text input aims to stimulate. This is the mental image or desired outcome that the user envisions. According to the first text shown in Table 1, how Playground AI created results are signified.

Semantics is the study of the meaning of words and how they are interpreted in different contexts. Therefore, the input text is crucial for accurately conveying the intended message. Saussure and Peirce extensively developed the system of signs, introducing the concepts of the signifier, the signified and the sign. This triadic connection forms the foundation of semiotic analysis and is essential for understanding the complexities of language and symbols. In the next step, Semiotics was briefly taught as a theory class to explain this relationship to students. The essential components of semiotics, such as *the sign, the signifier, the signified, the langue and the parole,* were explained.

4.1. The signifier

In the study of signs, the signifier represents the physical form of the sign, such as a word, sound or image, that conveys meaning. According to Saussure (2013), a signifier, like the word “building”, can appear random because there's no inherent reason why a specific sound or letters should represent the concept of a building. This unpredictability is essential to Saussure's theory, emphasising that language and signs are products of

society. In AI design, signifiers are used to describe concepts, but they must be chosen carefully as their randomness affects the outcome. For instance, instructing a robot to illustrate “a building”, “a brick building” or “a red brick Victorian building with a chimney” indicates different buildings. As indicators, signifiers must be clear and providing more technical information can change what robots comprehend, which is known as the signified.

4.2. The Signified

The signified is the mental image that the signifier conveys and brings to mind. It's more about a concept or the idea and meaning behind the form. Using the previous example, the signified would be the mental picture of a building: the idea of a tall building with windows, doors and roofs. The signified is not a physical object but a mental concept that we connect with the signifier. This connection between the signifier and signified is crucial because it shows how meaning is formed by combining structure and concept. Therefore, before giving instructions to the robots, students must carefully decide what should be conveyed from the overall descriptions. What is the main idea and the message behind all the descriptions? When robots receive the text, they try to understand the entire concept before processing the image. Therefore, the order of words, terminology, grammar and vocabulary are directly connected to the intended meaning. For that reason, the images generated by AI can be quite different from the text, as what the robot conveys goes beyond the text. For instance, the robot might show Queen Victoria, a chimney and a red brick building when given the prompt “Victorian, red brick building and chimney” instead of “a red brick Victorian building with a chimney”. Therefore, the description of the scene must be carefully structured and constructed and this is referred to as a sign.

4.3. The Sign

A sign is composed of a signifier and a signified and both are necessary to establish a connection between them. For instance, in the word 'building', 'building' is the signifier and the concept of a building is the signified, together forming the sign 'building.' This combination is essential for communication and understanding. Saussure asserts that the relationship between the signifier and the signified is not natural but is instead determined by social convention (Reda, 2016). Different languages may use different signifiers for the same signified concept, demonstrating how meaning is shared within a linguistic community.

4.4. The Langue

Saussure (2013) introduced the concepts of *langue* and *parole* as part of his language theory. These concepts are crucial for understanding the structure of language and the relationship between linguistic systems and their usage. *The langue* refers to the conceptual, ordered aspect of language. It consists of patterns and rules a social group communicates and includes signs, grammar and syntax that facilitate communication within a linguistic society. This system is distinct from individual usage and is a collective social institution. Saussure (2013) suggested that *langue* is the system underlying all individual acts of speech, much like a chessboard and its rules dictate the possible moves and interactions of the pieces. These rules are essential for individual phrases to convey meaning. *Langue* provides the framework that gives meaning to *parole* (Cao, 2022).

4.5. The Parole

On the other hand, *parole* refers to the individual, tangible acts of speech or writing. It is the performance of language by people in actual circumstances. Parole contains the choices and interpretations in phrases used by speakers and authors. These acts are miscellaneous and various, recalling individual style, context and objective.

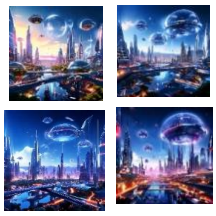
Langue is a social, stable and shared language system, *while parole* is personal, dynamic and variable. It's the real-world embodiment of *langue*, reflecting the creativity and adaptability of language users (Saussure, 2013). *Langue is* the abstract and theoretical representation of a language's overall system and rules, while *parole* is the concrete manifestation of individual acts of speaking or writing. This contrast highlights that *langue* is collective, whereas *parole is* personal, giving language users the power to express themselves uniquely.

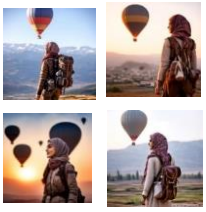
After explaining the tolls and definition of semiotics, students were asked to read The Eiffel Tower and Other Mythologies by Barthes (1979) and Semiotics of Architecture by Umberto Eco (2019) to see how these two philosophers exemplified semiotics in architecture. In the first example, Roland Barthes demonstrates how the Eiffel Tower can be taken as a piece of sign and how semiotics can be applied to it to interpret the meaning behind its monumentality. In the first book, Roland Barthes examines the Eiffel Tower as a sign and explains how semiotics can be used to interpret its meaning. He breaks down the tower's connotation, denotations and metaphoric meaning, showing how it represents the Industrial Revolution and the symbolism of Paris (Barthes, 1979). In the second book, Umberto Eco discusses how to describe architecture before it is built. He examines whether it's possible to explain architecture in writing and if this explanation can create similar images in people's minds. Considering the design with AI, students were requested to think about both approaches before using robots. Like Barthes and Eco's method, students were asked to consider what a building looks like at first sight (connotation), its secondary or symbolic meaning (denotation) and how to describe it figuratively.

5. Restructuring the prompt by practising semiotics

After learning about these approaches, the students were asked to revisit their fictional cities and reconsider how they described them in terms of architectural function, material, structure and detail. They were instructed to pay attention to the word order, as small changes in description can significantly impact the mental image formed. The students practised describing their cities using different combinations of words and then checked if the robots accurately captured the described images. This process could be repeated forever to ensure that all details are accurately portrayed. However, they stopped after providing four Turkish and four English definitions of the same city as they noticed the differences, even from the second description. They included more architectural details and terminology each time, as shown in Table 2.

Table 2. Extending the text with semantic and semiotic knowledge

Case Study	Group 1	Group 2	Group 3	Group 4
2nd English Definition of A City	A city submerged in a bubble in space. It is a city where technology is very developed. All buildings consist of modern capsules. People use flying cars and jetpacks. The capsules remain in the air with struts. The city has no ground.	A city consisting of islands stuck in the Middle of a swamp. Waterfalls flowing from the clouds cover the city.	The sky has become deadly dark and under a smoke-covered atmosphere, there is a futuristic city. This metropolis, with huge neon signs, rises like a maze of concrete and steel. Huge skyscrapers rise on every corner, connected by intertwined roads and passages. The surfaces of buildings are covered with holographic advertisements and neon signs. These signs are filled with constantly changing colours and images to attract people's attention.	An environment where people walk on a concrete floor and suddenly the concrete turns into water. At the end of the ground made of water, a transition with a mixture of water and steam passes to an environment where people walk on clouds. In this environment, the floor, ceiling and walls are made of clouds.
AI responses To 2nd English Prompts in Playground				
3rd English Definition of A City	A city submerged in a bubble in space. It is a city where technology is very developed. All buildings consist of modern capsules. People use flying cars and jetpacks. The capsules remain in the air with struts. The city has no ground. There are parking spaces above each capsule. Its inhabitants are gilled avatars.	A city consisting of islands stuck in the Middle of a swamp. Waterfalls flowing from the clouds cover the city. Wild animals live in the swamp.	The sky has become deadly dark and under a smoke-covered atmosphere, there is a futuristic city. This metropolis, with huge neon signs, rises like a maze of concrete and steel. Huge skyscrapers rise on every corner, connected by intertwined roads and passages. The surfaces of buildings are covered with holographic advertisements and neon signs. These signs are filled with constantly changing colors and images to attract people's attention. The streets of the city look like a complex labyrinth. While pavements drenched in rain reflect reflections of neon lights, the lights of flying cars illuminate the dark sky.	An environment where people suddenly turn into water while walking on a concrete floor. At the end of the ground made of water, they pass through a transition with a mixture of water and steam to an environment where they walk on clouds. In this environment, the floor, ceiling and walls were made of clouds, and some clouds turned into ice masses. In this environment, we see animals such as penguins and polar bears that live in cold climates.

AI responses To English Prompts in Playground				
The last and the most detailed Turkish definition of the city (5th prompt)	Uzayda baloncuğun içinde sular altında kalmış bir kent. Teknolojinin çok geliştiği bir şehir. Tüm binalar modern kapsüllerden oluşuyor. İnsanlar uçan arabalar, jetpackler kullanıyor. Kapsüller dikmelerle havada kalıyor. Kentin zemini yok. Her kapsülün üstünde park etme yerleri var. Oranın halkı solungaçlı avatarlardan oluşuyor. Kentin etrafını saran baloncuk şeffaftır. Kentin aydınlatmasını uzaydaki yıldızlar sağlıyor. Kentin belli bir kısmı çalışan, geriye kalan kısmı ise savaşçı. Halkın tek amacı huzur ve refah halinde yaşamak.	Dağlar arasında izole bir alanda konumlanan bir kent. Bu kent uzaktan bakıldığında küçük görünen fakat içerisine girildiğinde devasa boyutlardadır. Oldukça aydınlık olan kent devasalığından ötürü gölgelerde kalır. Kent yeşil, kırmızı, mavi, pembe, sarı, mor renklerden oluşur. Kentte devasa boyutlardaki çiçek ve mantarların arasından yükselen bir şato gözükür. Bu şato yarı saydamdır ve kentteki insanlar bu şatoda yaşar.	Gökyüzü ölümcül bir karanlığa bürünmüştür, dumanla kaplı bir atmosferin altında, füturistik bir şehir vardır. Neon ışıklı devasa tabelaların olduğu bu metropol, beton ve çelikten bir labirent gibi yükselmektedir. Her köşe başında yükselen devasa gökdelenler, iç içe geçmiş yollar ve geçitlerle birbirine bağlıdır. Binaların yüzeyleri, holografik reklamlar ve neon tabelalarla kaplanmıştır. Bu işaretler, insanların dikkatini çekmek için sürekli olarak değişen renkler ve görüntülerle doludur. Şehrin sokakları ise karmaşık bir labirent gibi görünür. Yağmur altında kalan kaldırımlar neon ışıklarının yansımalarını yansıtırken, uçan arabaların ışıkları karanlık gökyüzünü aydınlatmaktadır. Şehrin merkezi ne kadar modern olsa da merkezden uzaklaştıkça yıkık dökük binalar, kirli sokaklar ve bakımsız yapılar artmaktadır. Gökyüzünden şehre bakıldığında geleceğin distopik şehri net olarak görünür	İnsanların betondan bir zeminden yürürken aniden betonun suya dönüştüğü bir ortam, Sudan oluşmuş zeminin bitiminde su ve buhar karışımı olan bir geçişten bulutların üzerine yürünen bir ortama geçilmekte. Bu ortamda zemin, tavan, duvarlar buluttan yapılmış, bazı bulutlar buz kütlelerine dönüşmüş. Bu ortamda soğuk iklimde yaşayan penguen ve kutup ayısı gibi hayvanlar görmekteyiz. Bulutlu odadan çıkılıp suda yürünen koridora dönülüp ilerlediğimizde ateşle suyun birleşiminden oluşun tüflerin olduğu bir geçişten lavlarla dolu bir ortama geçilmekte bu ortamın zemini tavanı duvarları lavlardan oluşmakta. Bu ortamda sıcak iklimde yaşayan akrep vb hayvanlar görmekteyiz. Ortamın genelinde baktığımızda lavlardan oluşan ortamı oluşturan bir yanardağ görmekteyiz bu yanardağdan akan lavlar lav ortamını oluşturmakta. Bulut ve buz karışımı olan odayı da oluşturan bir buz dağı görmekteyiz bu buz dağından akan buzlar bulut odasını oluşturmakta.
AI responses To 5th Turkish Prompts in Playground				
The last and the most detailed English definition of the city (5th prompt)	A city submerged in a bubble in space. It is a city where technology is very developed. All buildings consist of modern capsules. People use flying cars and jetpacks. The capsules remain in the	A city consisting of islands stuck in the Middle of a swamp. Waterfalls flowing from the clouds cover the city. Wild animals live in the swamp. Transportation between the islands is provided by vines. People live inside mushrooms.	The sky has become deadly dark and under a smoke-covered atmosphere, there is a futuristic city. This metropolis, with huge neon signs, rises like a	An environment where people suddenly turn into water while walking on a concrete floor. At the end of the ground made of water, they pass through a transition with a mixture of water and

	air with struts. The city has no ground. There are parking spaces above each capsule. Its inhabitants are gilled avatars. The bubble surrounding the city is transparent. The stars in space provide the illumination of the city. A certain part of the city is working, the rest is warriors. The sole purpose of the people is to live in peace and prosperity.		maze of concrete and steel. Huge skyscrapers rise on every corner, connected by intertwined roads and passages. The surfaces of buildings are covered with holographic advertisements and neon signs. These signs are filled with constantly changing colors and images to attract people's attention. The streets of the city look like a complex labyrinth. While pavements drenched in rain reflect reflections of neon lights, the lights of flying cars illuminate the dark sky. No matter how modern the center of the city is, as you move away from the center, dilapidated buildings, dirty streets and neglected structures increase. When looking at the city from the sky, the dystopian city of the future is clearly visible.	steam to an environment where they walk on clouds. In this environment, the floor, ceiling and walls were made of clouds and some clouds turned into ice masses. We see animals such as penguins and polar bears that live in cold climates. When we leave the cloudy room and return to the corridor where we walk on water, we pass through a passage with tuffs, which are the combination of fire and water, to an environment full of lava. The floor, ceiling and walls of this environment are made of lava. We see animals such as scorpions etc. that live in hot climates. When we look at the environment in general, we see a volcano that creates an environment consisting of lava. The lava flowing from this volcano creates the lava environment. We see an iceberg that forms a chamber that is a mixture of cloud and ice. The ice flowing from this iceberg forms the cloud chamber.
AI responses To 5th English Prompts in Playground				
Closest image of what students imagined in the beginning	 Illustrated by the 1st pron	 Illustrated by the 5th prompt	 Illustrated by the 5th prompt	 Illustrated by the 3rd pron

6. Result

The results in Tables 1 and 2 show that:

Using AI in the architectural design process is always challenging since the result's owner is always surprising and never inevitable and who the real creator is is never inevitable. This process gives AI a quasi-subject role (Coeckelbergh, 2023). Considering that each prompt or text was designed and detailly described by students, the outcome is expected to be owned by the students. However, compared to the visual datasets of students in Table 1, the results of AI cannot be matched %100 percent. It means the creativity of robots and their can interpretation of the text can present surprising and sometimes original, unexpected results that do not fully belong to either of them.

• AI does not specify Turkish terminology, native language, or personal parole, so the robots could not predict and decode Turkish terminology or native speech while they could predict English words. Since robots are written in programming languages like Python and C++, they are designed to understand English. Although machine learning and deep learning allow them to interpret and understand other languages, they are less successful than English.

• AI result image sets (of English descriptions) are associated with students' imaginations and pre-datasets, whereas Turkish results are entirely irrelevant. The Turkish language and parole results represented portraits of human beings from different cultures (mainly the Middle East), even though the students only used architectural terminology in native dialects.

• It was expected that the result of the most detailed expression would be the closest image of what was pre-imagined; however, it was the opposite; the less detailed robot was given and it was more creative and original. However, many students can capture an image as they imagine it from very early sketches because the more complicated the text is, the more confused the robot gets and creates more complex images.

The outcomes mentioned above stem from the limitations of robots' language abilities. Unlike individual languages shaped by social interaction, robots' language lacks a cultural or social context. This raises questions about the effectiveness of robots' language in understanding and interpreting human prompts.

Language structure goes beyond the individual's will; in this respect, language does not allow individual freedom. Likewise, the language of robots can only reorganise the prompts and guess the meaning behind the prompt if descriptions are given. This limitation weakens robots because human beings also communicate the word (parole) manifested by the individual and is a product of individual will. It is at the discretion and under the control of the individual. So, a strange emotional sound can be a signifier of the need for help before yelling like 'help', while grammatically, it does not mean anything.

In conclusion, language serves as both the tool and the product of speech. According to Saussure, language use reflects human capabilities and adaptation to a community of individuals (Godel, 1970). This underscores the importance of individual vision and capability in architectural design. Each student's unique abilities and perspective are critical in imagining and describing their cognitive space within the limitations of language. Therefore, even the most advanced robot may not fully replace the need for a well-equipped individual to master the design process with technical, historical and theoretical architectural knowledge.

Assessment of the AI

Tables 1 and 2 show a particular difference between how robots responded to Turkish and English prompts. As the designs for the Turkish prompts do not include any signifiers and the students own imaginary data sets, this research proved that robots still need to be improved for understanding and interpreting Turkish language and dialects to turn them into architectural designs. Therefore, these designs are assessed as *bad* because none of the given elements (text) are included. However, the robot makes assumptions through the structure of the Turkish language and it randomly generates images related to Turkish culture and Middle Eastern countries, as in the result of Group 1, Group 2 and Group 4, even though no references were given to them in the text. However, in group 3, students used some words like "labirent, neon, holographic, distopik, atmosfer" which are written quite similarly in English. The "Labyrinth, neon, holographic, dystopic, atmosphere" robot can predict these words since their semantic order is partially illustrated even though adding some Turkish mosque inside of it.

English prompts included almost every detail and went beyond the descriptions. Each time students developed the languages with new terminologies and technical details, the robot became more creative. Adding new words lets the machine recall more visuals from its library to blend and recreate a new image. Therefore, some students, like Group 1, captured almost the same picture they described in the first prompt, while Group 3 got in the third one. Groups 2 and 4 got the closest image to their imagination in the fifth prompt since their cities were more complex, so the structure of the text had to be designed more carefully. Therefore, overall, designing with AI in English can take some time and practice to get a good design, which is also potentially unpredictable.

7. Discussion and Conclusion

Throughout history, architecture has been interpreted by connecting form and function. The cave was reinterpreted by its users, sparking the first spatial production. Architecture gained meaning by blending knowledge and experiences from the cave, leading to new usage ideas. Tanyeli (1999) believes that architecture is a re-production process, stating, "Architecture is an activity related to the society to which it belongs; architecture as an object is a kind of object of understanding activity". The same activity can be seen in language and linguistics since language exists to communicate in the culture and society.

Every society creates architecture and language to fulfil specific needs and complement daily activities. Our perception of the external world relies on interpreting and assigning meaning, similar to how early humans did. Every sign requires an interpreter (Tejera, 1988). Peirce identifies logic, grammar and rhetoric as the three main components of semiotics, which involve "form (object), interpretation and interpretant" (Colapietro, 1989). The meaning conveyed by a sign only changes with an interpreter. Consequently, AI robots are the current interpreters who must be enhanced with cultural and traditional dialects, langue and parole to improve results.

While AI algorithms can generate realistic designs, they manipulate image data based on a set of parameters. These algorithms imitate the style of a particular designer's work, creating new artworks by blending different artistic styles using Generative Adversarial Networks (GANs) and Deep Neural Networks. GANs are commonly used to generate data from scratch. For that reason, the richness of their visual library directly impacts the architectural design process. Since text-to-image robots recall the images

according to their title corresponding to signifiers or the definitions in the prompt, it is vital to spell correctly and have a visual library associated with text (signifiers). *English* is a fusional language relying on morphemes carrying multiple grammatical meanings that combine with words to create different forms (Shay, 2013). Therefore, in terms of interpreting English text, robots call images related to words since the meaning of words does not have to be related to the roots of the words. Turkish is the opposite; an agglutinative language primarily uses discrete particles (prefixes, suffixes and infixes) for inflexion (Ido, 2003). Fusional languages combine inflectional categories, often incorporating multiple categories into a single word ending, making it difficult to isolate the original root. Thus, when Turkish text is sent to the robot since the word's root is the same, but the meaning changes with prefixes and suffixes, it is always hard to understand precisely. Also, there are numerous forms and genres in Turkish literary arts, making this process more complicated like applying sarcasm or antithesis to explain one thing with its opposite, simile to compare one thing with another and metaphor to implicitly compare two unrelated things, typically by stating that one thing is another, making this process harder and embedded in the culture (Hofman, 2023). That is why Saussure (2013) believes that separating language from speech means separating social fact from individual fact; separating basic fact from it means distinguishing from secondary, more or less coincidental phenomena.

Many heteronym words in Turkish are written the same, while sound changes according to the text's context and meaning. This unique feature of the Turkish language poses a significant challenge for text-to-image robots, as even Turkish speakers can misunderstand numerous expressions belonging to the local language and vernacular culture. Therefore, it is essential to note that even if robots are developed to understand Turkish, it will still be debatable if they receive the expression well. Hence, if it is included in the architectural curriculum and education, signers of the space must be chosen carefully and semiotic systems should be structured by eliminating suspicious words, including metaphors, synonyms and homophones, during dialoguing with a robot.

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