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Original Research Article

# Identifying Types of Imagination in Architectural Work Based on Neurophilosophy Perspective

## (Analysis of some Examples of the World's Contemporary Architecture)

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**Abstract**

**Problem statement:** Imagination plays a complex role in the architect's design process and the formation of the architectural work. Since the creation of an architectural work requires a multi-layered and interactive process, it is important to know the imagination and the factors influencing it. Imagination, as a part of this complex process, is the architect's ability to imagine space, structures, 3D designs, and functional aspects. But the design issue and concepts related to it, and on the other hand, while creating a work with an extraordinary form, sometimes prevents from paying attention to imagination and its nature. What are the types of architects' imaginations in creating an architectural work?

**Research objective:** The purpose of the research is to identify the types of imagination and its role in architectural work based on the neurophilosophy perspective; which, while responding to the physical needs of the audience, provides the basis for adapting to the audience's imagination and creating a desirable atmosphere.

**Research method:** The current research is qualitative, employing a qualitative research strategy (interpretive-analytical), which deals with the description, analysis, and explanation. Collecting data was carried out through library studies and by studying architectural works. The data analysis method is qualitative. Through theoretical foundations literature review and analysis of some examples of the world's contemporary architecture, the types of imagination and its role were proven. Row House, Carlo Felice Theater, Jewish Museum, Solaris Building, Thermal Baths, House II, Borromini's Church, 8 House, Guggenheim Museum, and Capsule Tower are selected as examples of architecture.

**Conclusion:** The findings of the research show that imagination in the creation of architectural work can be placed into ten types: personal, collective, ethical, ecological, embodied, linguistic, narrative, representational, material, and metabolic imagination. The role of each type of imagination, based on the neurophilosophy perspective, can be placed in four categories: mental imagery-based, intentionality-based, novel combinatorial forms of the imagination, and phenomenology-based forms of the imagination.

**Keywords:** *Architectural design process, Architectural imagination, Image, neurophilosophy perspective.*

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## Introduction

What is design and its process has always been the concern of architects and architectural theorists. In addition to indicating the issue's importance, the diversity of views indicates the uncertainty and complexity of the issue. The design in its creation role originates from the personal and mental world of the architect (inner world) which, along with the data of the external environment (outer world), originates from his imagination during a complex process. It is not possible to directly understand the architect's imagination in creating a work. Still, by trying to understand its levels and different ways of looking at the subject of imagination, it is possible to understand its place in the architect's design process. The complex connections of the design process are simultaneously formed in the designer's mental space. The formal and physical appearance of the work is always moving and changing in this process. Before the physical appearance of the work, the architectural work is born and exists in the designer's thoughts (Amini, 2019, 54). Despite the knowledge of the complex process of architectural design, usually, the recognition of the requirements of the outside world is given priority, and paying attention to the subject of design and its related concepts is mostly the subject of research. Previous studies show that the topic of the act of architecture and carrying out the design process, as well as the effect of architecture, has been the focus of researchers; While paying attention to the world of the architect's mind and how the work is formed in the designer's mind, requires more research. What is sought in this research is to identify the types of architectural imagination that manifest in the creation of the work; Because knowing this issue can affect the way the user experiences the space and lead to the desirability of his experience. The answer to the research question is based on the neurophilosophy perspective, and the neurophilosophy perspective is an interdisciplinary study of neuroscience and philosophy that relates neuroscience studies to reasoning. It examines those that are traditionally classified as the philosophy of mind; Therefore, the structure of the theoretical foundations, first by referring to the "nature of imagination" based on various points of view, then "imagination from the perspective of philosophy" - as the basis of the neurophilosophy perspective - and in the next section "imagination from the perspective of neurophilosophy perspective " and finally "imagination in architecture" is formed.

## Research Background

To understand the subject, it is necessary to have a look at the research and currents formed in the past regarding "architectural imagination". In general, views on design; are audience-oriented, designer-oriented, product-oriented, or process-oriented (ibid., 54). Since the topic of imagination and its role in the creation of architectural work is related to the mental space of the architect, as a result, the designer-oriented point of view in the design process can be a subject of discussion. The importance of the issue after the Second World War was due to the need for mass construction and to some extent the industrialization of the construction process (Akbari & Flamaki, 2018). Examining the models of the design process shows that most of the models are based on some kind of idea or concept (Bastani & Mahmoudi, 2018, 6). Edward White states that concepts are derived from problem analysis; They appear with any scale and have a hierarchical nature (White, 1975, 30). In the book "Introduction to Architecture", McGuinty considers concepts as ideas that organize various elements in a general composition. These elements may be ideas, imaginations, thoughts, and observations (Bastani & Mahmoudi, 2018, 10). Mads Nygaard Folkman's book "The Aesthetics of Imagination in Design" examines imagination in design in a defined process. His findings are based on personal evaluation, analysis, poetic views, and logical arguments (Folkmann, 2013, 13).

In the paper "The Place of Imagination in the Creation of Artwork", from an Islamic point of view, Noghrekar et al. discuss the meaning of imagination in the West and its influence on

Western art, and then compare it with the concept of imagination in Islamic thought, and the place of imagination in It explains the creation of the work of art (Noghrekar, Mozaffar & Azimi, 2010, 91). In another paper entitled "Explaining the place of meaning and image in the process of architectural design", Azimi mentions image as a mediator of the manifestation of the field of meanings in architectural design and discusses its role in the process of architectural design (Azimi, 2019, 77). In the literature on architecture and imagination, one can find scholars who have focused on historical imagination; Writers such as Martin Bressani, who in the book "Architecture and Historical Imagination" skillfully traces the complex intellectual development of Violet Le Duc and outlines the attitudes he adopted towards the past (Bressani, 2014). On the other hand, researchers who look at imagination from a futuristic perspective; Writers such as Paul Dobraszczyk, who in the book "Future Cities: Architecture and Imagination" explores a stunning range of imaginary cities, claim that imagination is a tool for understanding the future of cities (Dobraszczyk, 2019). From what has been reviewed, it is possible to identify researchers who are focused on the product-oriented, or process-oriented point of view (Noghrekar et al., 2010; Azimi, 2019). Another group of researchers focused on the audience-oriented view (Bressani, 2014). Regardless of whether, imagination is examined from the point of view of its position in the future and the desire of the audience, or its position in architectural representation (Frascari, Hale & Starkey, 2007). But it is rare to see the designer-oriented view and more precisely the raw materials of the architect's design, such as architectural imagination. A gap that shows the need to address the subject of the imagination of the architect and the creator of the architectural work, especially from the perspective of a neurophilosophy perspective. It is necessary to review this process and examine the contribution of other effective factors in addition to the logical and reasoning view.

## Theoretical Foundations

### • Nature of imagination

Human imagination manifests itself in countless forms. With the power of imagination, the possible and the impossible are imagined. Analyzing and trying to understand imagination involves several fields of study, including anthropology, archaeology, medicine, neuroscience, psychology, philosophy, and art. Various roles have been attributed to imagination and imagery in different areas of human understanding and activity. Not surprisingly, there cannot be a single component of the mind that can fulfill all the various roles attributed to imagination (Kind, 2013, 141–159). One of the ways to understand the nature of imagination is to draw distinctions and ruling classifications; Because the neurophilosophy perspective tries to clarify the methods and results of neuroscience by using the methods of the philosophy of science. From this point of view, it seems necessary to briefly mention the philosophical points of view regarding imagination. Table 1 shows the different viewpoints that study the subject of "imagination".

### • Imagination from the perspective of philosophy

Philosophers have tried to clarify the nature of imagination in three ways. First, they have tried to disambiguate the different meanings of the term imagination (types of imagination). Second, they have provided partial classifications to distinguish types of imagination (classification of imagination). Third, they have determined norms related to the imagination (norms of imagination) (Liao & Gendler, 2020, 6). Philosophers can generally be divided into two categories of people who have attributed a secondary role to the imagination, such as Sartre, Plato, Hobbes, and philosophers for whom imagination has an important and almost mystical role; like Kant, Coleridge, and Schelling (Brann & Sepper, 2016, 30). Aristotle can be placed between these two opposing categories because he primarily considered imagination as a distinct faculty that operates

Table 1. The nature and definition of imagination from 6 different perspectives. Source: Authors.

| Theorist | Nature and definition | Perspective |
|---|---|---|
| Sartre-Kant | Some philosophers believe that imagination is a purely mental structure that allows the creation of imaginary worlds and scenarios. Others believe that imagination has a deeper connection with reality and can be used to gain insight into the nature of existence (Brann & Sepper, 2016, 30). | Philosophy |
| Farabi-Suhrawardi | According to Muslim philosophers, imagination has two different but related meanings. They also deal with the concept of imagination and imaginary things under the powers of the human soul and consider it as a kind of human perception, which is connected to the world of imagination due to its connection with humans. On the other hand, they imagine a world independent of human existence under the title of the imaginary world; A world independent and separated from humans and between the world of the material world and the world of the spiritual realm (Akbari & Falamaki, 2018, 127). | Islamic Philosophy |
| Freud-Jung | Imagination originates from psychological processes and is known as a mental characteristic. Perhaps psychological studies focused on the unconscious can be considered the beginning of emphasizing the dynamic relationship between the conscious mind and the unconscious content of the psyche. Psychologists such as Freud and Jung tend to use metaphor and imaginary in exploring the full spectrum of human experience; Until the phenomenon of imagination was placed as a central concept in Jung's psychology (Erickson, 2019, 9). | Psychology |
| Gaston Bachelard | Gaston Bachelard bases his thinking on the knowledge of the poet's and artist's imagination beyond the analysis of literary or artistic images. In the images he studied, he considers the four elements as a template for measuring the effective elements in the author's imagination and uses mythological archetypes and analysis of the artist's imagination (Haj Hasani & Mahmoudi, 2013, 1). | Phenomenology |
| Mark Johnson | Much research has been done on how imagination works and its role in cognitive processes. Imagination, as a cognitive process, can generate new and creative ideas. Among the mental realities that are widely discussed in contemporary discussions about imagination are: belief, mental imagery, memory, and supposition (Liao & Gendler, 2020, 1). | Cognitive Sciences |
| Lev Vygotsky | Imagination is considered an individual and cultural phenomenon that is based on a person's embodied experience of the world, social interactions, and the use of symbolic resources (Zittoun et al., 2020, 143). Sociocultural psychology considers imagination as more than illusion or escapism: imagination is conceived as a resource that an individual or group of individuals calls upon to draw upon available knowledge, experience, cultural artifacts, and sophisticated skills (Glaveanu & Zittoun, 2017, 10). | Sociocultural |

in a wide range of cognitive processes. Table 2 shows a summary of the history of ideas up to 1900 (O'Connor & Aardema, 2005, 235).

**• Imagination from the perspective of neurophilosophy perspective**

In philosophy, imagination has been discussed for centuries, but the topic is generally considered so complex that no common classification has emerged. However, a key element is that imagination involves mental representation that is different from perception or memory (Liao & Gendler, 2020, 5-8). One of the frameworks for structuring and classifying aspects of imagination is Stevenson's classification (Stevenson, 2003, 238-259). This category describes twelve types of imagination, which are mostly descriptive. An important shortcoming of this and other approaches is that it does not consider the mechanisms or processes that should characterize any classification of imagination. Hence, an interdisciplinary approach is likely to yield more useful results. More recently, Abraham has organized this work into a framework of imagination, an interdisciplinary framework (Abraham, 2020, 6-7). Table 3 shows these five thematic categories that suggest coherent categories of imagination.

The purpose of this framework is to provide a comprehensive understanding of the functioning of human imagination. Under this framework, various experiential and cognitive states of imagination are grouped into one of five coherent thematic categories organized around central operational features. The category of "Mental imagery-based forms of the imagination" includes perceptual forms (visual, auditory, etc.) and motor forms of imagery, which, due to their strong overlap with perception and action, draw their influence from the external environment. In contrast, the internal milieu, in the form of inner and emotional awareness, is a source for processes that belong to the category of " Phenomenology-based forms of the imagination"

Table 2. Philosophy and conceptualization of imagination. Source: O'Connor & Aardema, 2005, 235.

| Imageless imagination | | Imagination as originality, creativity, and transcendence | | Imagination as memory and or a picture in the mind | | Imagination as a faculty | |
|---|---|---|---|---|---|---|---|
| Imagination as a form of pretending | Ryle | Imagination influenced from above serving creativity, religion, and poetry | Bacon | Imagination as a decaying sense | Hobbes | The process by which an image is presented to us, and present in all cognition | Aristotle |
| Imagination is to think of something as possibly being so | White | Imagination as the power to gain (transcendental) knowledge | Kant | Storehouse of forms received through senses | Aquinas | Imagination situates the unseen in time and place | Sartre |
| Imagination is in the service of intention and is an echo of a thought in sight | Wittgenstein | Imagination transcends the 'I' to produce non 'I' | Fichte | Mental imagery is quasi-perceptual experience | Furlong | Representation of an object without its presence | Kant |
| - | - | - | - | Imagery as perceptual anticipation | Gibson | Imagination connects mind and body | Descartes |
| - | - | - | - | Imagination as the lost vivacity of sense impressions | Hume | Seeing similarity in difference | Shelley |

that are involved in the aesthetic response during the perception of visual arts, music, literature, etc. A fundamental commonality among operations that falls under the category of "Intentionality-based forms of the imagination" such as mental state reasoning and mental time travel, is that they all initiate a process that is primarily collective to arrive at the most plausible explanation of a certain position is reached from the point of view of what corresponds to what one considers to be right. In contrast, when a field requires moving beyond what is known to search for new solutions, explanations, or expressions; Processes belonging to the category of "Novel combinatorial forms of the imagination" such as creativity, counterfactual reasoning, and hypothesis generation come into play. The last category is "Altered states of the imagination", which includes normal states such as those experienced during dreaming and meditation (ibid., 6-7). In Fig. 1, four main categories can be seen concerning related concepts and mental processes.

According to cognitivism, imagination refers to the ability to create and manipulate mental representations without relying on any visual or other stimuli (Ganis & Schendan, 2011, 239-252). This interpretation sets imagination apart from other mental processes as it occurs independently of immediate reality (Koukouti & Malafouris, 2020, 38). The neurophilosophy perspective studies the relationship between neuroscience and human imagination. The conceptualization of imagination in these fields helps to establish connections between imagination and various cognitive, behavioral, and material processes, and its impact on the lives of humans in

Table 3. A neurophilosophically informed classification of the imagination. Source: Abraham, 2016, 4197-4211.

| Phenomenology (emotion) | Novel combinatorial (generative) | Intentionality (recollective) | Mental imagery (perceptual/motor) |
|---|---|---|---|
| Aesthetic engagement | Creative thinking | Mental state reasoning | Visual imagery |
| Visual art-related aesthetic response | Hypothetical reasoning | Moral decision-making | Auditory imagery |
| Music-related aesthetic response | Counterfactual thinking | Mental time travel/future thinking | Musical imagery |
| Literature-related aesthetic response | Hypothesis generation | Autobiographical/ episodic memory | Tactile imagery |
| … | … | | … |
| Altered States | | | |
| Dreams, hypnosis, drug-induced states, meditative states, hallucinations, out-of-body experiences, delusions, confabulations … | | | |

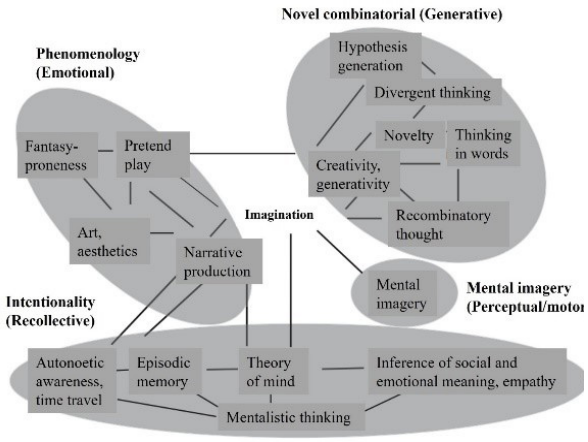



Fig. 1. Four primary domains of imagination. Source: J. Crespi, n.d., 762.

the past and present (Fuentes, 2020, 14). This view can be described as a combination of dominant philosophical ideas on imagination, along with research paths and functional correspondences in neuroscience.

- **Imagination in Architecture**

The truest and most meaningful architecture emerges not only from the logical consensus of technical solutions but more subtly and intricately from personal imagination in dialogue with material constraints (Landrum, 2016, 71–83). Architects who involve "personal Imagination" in design, experience reality as a manifestation that they seek to transform into their works. As Paul Kidder states, "One who lives in the world of architecture is one in whose imagination such experiences loom large" (Kidder, 2012, 90). On the other hand, "collective Imagination" is necessary for architects along with individual and professional roles.

The role of the architect in such scenarios is to cultivate, embrace, and actively participate in the visualization of the social, spatial, and political imaginations of others. Collective imagination is the basis for the formation of a set of procedures that organize intellectual movements from top to bottom. These movements are, in fact, public demands (Landrum, 2016, 73). "Ethical Imagination" is empathic imagination and requires the architect to put himself in the shoes of several others while resetting his moral and professional compasses. Ethical imagination is the root of collective imagination that is worth pursuing. Meanwhile, there are architects whose approach to nature is an ecosystem approach in which buildings and humans are interrelated elements. This ecosystem includes individual and collective demands that can be examined under the title of "ecological Imagination" (ibid., 73). Every dictionary in the 21st century defines imagination as the capacity to form images in the mind. However, imagination cannot be reduced to vision or visual impressions; although, like architecture, imagination is a fully embodied experience. The medium of imagination belongs to all senses. In the Phenomenology of Perception, Maurice Merleau-Ponty showed how "the senses communicate." (Merleau-Ponty, 2012).

Pallasmaa shows these concepts directly under the title of architectural imagination in a series of works such as The Embodied Image. "Embodied Imagination", is architectural imagination beyond the involvement of all bodily senses, and also visualizes dwelling. Architects design the embodied experiences of many other people with their bodies. As Mark Johnson argues, interaction with the physical and social environment - even in the imagination - provides the basis for creating meaning in architecture (Johnson, 2015, 40). From another angle, for many philosophers and a few architects, imagination is essentially linguistic and the result of verbal discourse with oneself and others. In any case, it should be acknowledged that discourse language plays an important role in architectural imagination (Landrum, 2016, 75). This claim can be understood by comparing reading a novel by an author to watching a movie adapted from that novel. Usually, after watching the movie, the audience is disappointed; Because literary images are livelier and more meaningful than illustrated images (Scarry, 2001, 47). Alberto Pérez-Gómez claims that "linguistic Imagination" is essential to the creation and interpretation of architecture. Similarly, Eisenman considers architectural work as a writing

that has come to life in the process of its formation and has expanded from its womb (Karimzadeh, Etesam, Foroutan & Dolati, 2018, 90).

Linguistic imagination is close to "narrative imagination". An architectural plan is a narrative plan that describes a sequence of related events that unfolds over time and has a meaningful relationship with our hopes, fears, and expectations of how things might turn out in this event (Landrum, 2016, 77). By creating ways to describe shared characteristics and experiences, the world is remade; And this is one way of understanding poetic imagination, which, according to Sullivan, is the primary ability of every "real" architect (Sullivan, 1965, 74). Poetic expression awakens man to new realities and restores "the life that may have been lost or [or forgotten]" (Bachelard, 2002, 72). The style of architectural narration, along with narration with words also uses images and "representational Imagination" shows its importance in this narration in one way or another. Regarding the gap between form design and material design, we can refer to Bachelard's comments. Bachelard observes how the "material cause" of imaginative activity has been neglected by philosophical discourse. Images arising from the matter create deeper experiences than form. Bachelard suggests a distinction between formal and material imagination, considering this feature. As it is clear, the existence of objects cannot be separated from their experience; "material Imagination" is a subject that is important in shaping architecture and the architect's ideas. Sometimes the world's events and incidents cause the formation of certain currents that cause the architect's imagination to form; Especially if the subject is related to the future and the form of human habitation and architecture. In Japan, the movement of metabolism was a kind of group thinking and collaboration that was formed at the same time as the world design meeting was held in Tokyo in 1960 with the strong influence of Kenzo Tange and his famous colleague Takashi Asada. The "metabolist Imagination" is derived from geometric shapes and mathematical formulas that, in addition to reflecting the electronic life of the modern age, do not forget the traditional ways of life of the Japanese people (Gardner, 2020, 56-59).

## Research Method

The current research is qualitative in nature and paradigm. In this research, from the ontological aspect, reality is not a material phenomenon and depends on the researcher's interpretation of it, and from the epistemological aspect, knowledge in this research is subjective and is the result of the analysis of the theory and some examples of contemporary architectural works; and from the methodological aspect is created through the presentation of different interpretations of the research subject and the study of the examples. The qualitative paradigm requires an inductive process that explains the multiple factors affecting the phenomenon (Groat & Wang, 2013, 10, 67, 71). The research strategy is qualitative and interpretative-analytical. The method of collecting information is library studies that include studies of theoretical foundations and a literature review of the research subject. After information extraction, compression, and classification, the qualitative data analysis stage was performed, which was done by referring to some contemporary architectural works. Due to its qualitative nature, the current research relies on documents and evidence, intuition, perception, and rational analysis and has an analysis stage. The method of analysis is reasoning and rational (Hafeznia, 2022, 267). In the method of qualitative analysis, researchers refer to 1- theoretical foundations and research literature, 2- statements, quotes, and points of view of the architect, 3- opinions of other researchers, as well as 4- reasoning and lived experience of the authors, The architectural works have been analyzed and the imagination used in the work has been identified and categorized. In Fig. 2, this process is depicted.

## Discussion

Architecture can be called the organizer of

imagination. Architectural imagery relates one's experience of the world to one's experience of the body through the unconscious process of internalization, assimilation, and visualization (Pallasmaa, 2011, 156). Referring to the works of leading architects and studying the statements of the creators of the works as well as analyzing the design process are the same research materials that are the basis of understanding the role of imagination in the architectural design process. Since the imagination and mental space of every architect is a personal phenomenon, as a result, knowing the types of imagination in architectural works requires studying their works and the contexts of their creation; Because the original architecture provides the background and platform for the spiritual growth of the user and allows the user to enter the mental world within. For this purpose, some examples of contemporary architecture examples were selected for analysis based on the architect's manifestos, the opinion of critics' writers, and architectural analysts, as well as the authors' lived experiences the availability of texts, and the type of architect's imagination was identified, and the type of architect's imagination was identified and its characteristics were examined. Selected architectural examples along with the year of construction include House:

- II- America (1970) Peter Eisenman.
- Capsule Tower Building, Japan (1972), Kisho Kurokawa.
- Row House, Japan (1976), Tadao Ando.
- Carlo Felice Theater, Italy (1991), Aldo Rossi.
- Thermal Baths, Switzerland (1996), Peter Zumthor.
- Guggenheim Museum, Spain (1997), Frank Gehry.

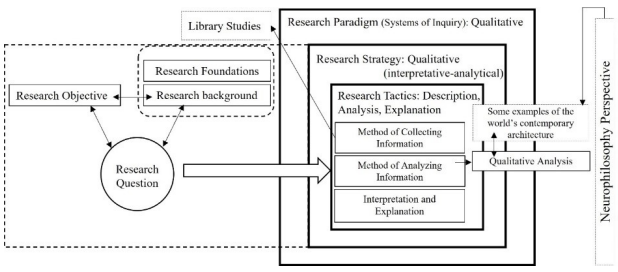



Fig. 2. Practical research model. Source: Authors.

- Borromini's Memorial, Switzerland (1999), Mario Botta.
- Jewish Museum, Germany (2001), Daniel Libeskind.
- Solaris Building, Singapore (2010), Ken Yeang.
- House Eight, Denmark (2010), Bjarke Ingels.

It has been tried to choose the architects and their works based on the diversity of distribution in terms of geography and cultural and individual background. The selected architectural examples include works built since 1970.

**• Analysis of examples of contemporary architecture based on types of imagination**

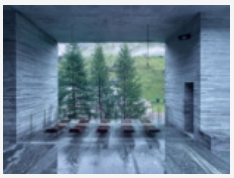
in Table 4, after describing the examples of architecture, the examples are described, analyzed, and interpreted to identify the type of imagination used in the work and analyzes and interprets architectural works focusing on personal, collective, ethical, ecological, and embodied imagination.

In visual analysis, the study of the visual elements of architecture, such as forms, shapes, lines, colors, and textures, and the analysis of how these elements are combined and manipulated to form a unique design (identifying any imaginative use of visual elements) has been done. In contextual analysis, the analysis of the architectural work is done by considering factors such as location, historical period, cultural influences, and social aspects. Understanding how the architect's imagination has reacted to these contextual factors and how they are incorporated into the design. Conceptual analysis has been done by analyzing the underlying concepts or ideas behind architectural work to investigate any creative or imaginative concept used by the architect to solve design problems or create a unique experience for users. In the functional analysis, evaluating how the architect has imagined and addressed the functional requirements in the design, is done. Analyzing how spaces are organized, planned, and different functions according to imagination; At the same time, practical needs are met. In material imagination, examining the materials used in construction and their relationship with form and function is done; the analysis of how the architect's

Table 4. Description, analysis, and interpretation of architectural examples and identification of personal, collective, ethical, ecological, and embodied imagination. Source: Authors.

| Row | Imagination | Type of analysis | Analysis and interpretation | Picture | Architect | Example |
|---|---|---|---|---|---|---|
| 1 | Personal Imagination | -Contextual (workshop experiences, national rituals and customs, numerous trips) | -Uncountable experiences and the creation of new mental ideas (Hellman, 2000, 6)<br>-The transparent geometry in works: reflecting his life, philosophy and previous experiences<br>-Travel in the world, after entering the world of architecture: getting to know different spaces and buildings |  | Tadao Ando (1976) | Row House - Japan |
| | | Architect: "You simply cannot put something new in a place; You have to absorb what you see around you and what's on the ground, and then use that knowledge with contemporary thinking to interpret what you see." (Architectural record, 2023) | | | | |
| 2 | Collective Imagination | -Comparative (strengthening the approach to the protection of historical monuments)<br>-Conceptual (paying attention to the issue of collective memory)<br>-Contextual (the role of time and people) | - Criticism of the lack of understanding of the city in the process of architectural practice with the publication of the book Architecture of the City<br>- Conscious and valuable formation of a city over time<br>- Urban memories belong to the past (collective memory); Memory comes through the lens of monuments; Historical monuments determine the structure of the city (Rossi, 1984, 58). |  | Aldo Rossi (1991) | Carlo Felice Theater- Italy |
| | | Architect: "It can be said that the city is the collective memory of its people, and like memory, it is related to objects and places. The city is the location of collective memory." (Rossi, 1984, 63). | | | | |
| 3 | Ethical Imagination | -Visual (reminding the user of ethics and human concepts in form and organization of space)<br>-Conceptual (integration of moral concepts with the memory of the city)<br>Contextual (referring to a historical event)<br>-User Experience (emotional interaction with the user and transferring concepts) | - Museum: a narrative of the social, political and cultural history of Jews in Germany: visible in organization of spaces and the architectural form<br>- The user, who enters the complex form with broken lines, experiences the Holocaust event in the form of spatial qualities, circulations and pauses: a sign of morals and high human concepts and from time to time being questioned and forgotten (Schneider et al. ., 2007, 56)<br>- Referring to a moral disaster, trying to keep this incident alive in German history and integrating it with the historical memory of the city. |  | Daniel Libeskind (2001) | Jewish Museum- Germany |
| | | Architect: "It's about how to bring together the seemingly contradictory aspects of this memorial, not only about a disaster; rather, it is about creating a vital and beautiful city from the 21st century." (Libeskind, 1992, 47). | | | | |
| 4 | Ecological Imagination | -Visual (existence of atrium with static ventilation)<br>-Functional (environmental considerations, ecological site creation)<br>-Conceptual (creating the maximum habitable green space) | -An ecological architect with a concern for protection and responding to the environment<br>- In this building, the ecological idea comes together with a ramp and experimental tools. |  | Ken Yeang (2010) | Solaris Building- Singapore |
| | | Architect: "I think green buildings are significant, but that's only part of the equation. Many people think that if a building is green, it is enough, but in fact, not only green buildings are needed, but also green jobs, green governments, green economy. I think buildings should imitate ecological systems." (Yeang, 1995, 28) | | | | |

Rest of Table 4. Description, analysis, and interpretation of architectural examples and identification of personal, collective, ethical, ecological, and embodied imagination. Source: Authors.

| Row | Imagination | Type of analysis | Analysis and interpretation | Picture | Architect | Example |
|---|---|---|---|---|---|---|
| 5 | Embodied Imagination | - Contextual (architecture based on the coordination of place and context)<br>- Conceptual (symbol of the building in the heart of the building and with stone)<br>-User experience (darkness and light, and discoverable features based on the interaction of the user's imagination and emotion) | -Great ability to create different atmospheres through skillful mastery of light and materials<br>- Building as a comprehensive presence of human senses<br>-Zumthor: An architectural work can have the qualities of a work of art only when the combination of its forms and content creates a powerful atmosphere that can affect the audience (Zumthor, 2010, 25).<br>-Imagination in architecture beyond visual imagination with multi-sensory perspective (Pallasmaa, 2011, 40). |  | Peter Zumthor (1996) | Thermal Baths- Switzerland |
| | | Architect: "The beautiful silence that I use in my works is combined with calmness and durability and a sense of presence and perfectionism, combined with the thermal passion that all these factors together provide a physical pleasure." (Böhme et al., 2014, 34) | | | | |

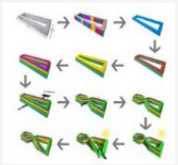
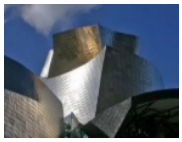
imagination has turned ordinary materials into extraordinary architectural expressions. In user experience analysis, analyzing and evaluating how users interact with and experience architecture in terms of emotional and physical is done; an analysis of whether there are imaginative elements that improve the user experience or evoke certain emotions. In comparative analysis, the studied architectural examples have been compared with other works of the same architect or other architects from different periods or styles to identify patterns in imaginative approaches. Based on the analysis, the type of imagination in the work of architecture has been identified. Table 5 is an explanation of linguistic, narrative, representational n, material, and metabolist imagination along with the analysis and interpretation of architectural examples.

**• Types of imagination concerning the neurophilosophy perspective in the architectural examples**

Mental imagery refers above all to personal differences in imagination. Imaginations that are related to the five senses and movement. Sometimes it is related to the visual representation of the architect, and sometimes it is related to the touch and acoustic characteristics of the surrounding phenomena. Therefore, the imagination of a person who is inspired by the personal experiences of an architect can well be related to mental imagery. Among the obvious examples of (collective) Intentionality-based forms of the imagination, one can refer to autobiographical memory, episodic memory (remembering memories of visiting buildings), episodic future thinking (imagining what the building construction method will be like in the future), mental state reasoning or Theory of mind (inference about what the space user or another person thinks about a certain phenomenon), self-referential thinking (evaluating one's thoughts and behavior) and moral reasoning (assessing the permissibility of one's own or another person's action) can be mentioned (Abraham & Bubic, 2015, 15).

What is in the collective imagination, as the involvement of other people's needs in design, in ecological imagination, attention to the future of the earth and the environment, and in metabolic imagination, attention to the social background and how architecture and the city are formed after the war, is noticed and moral imagination, all can be seen as an example of the role of the collective imagination. When the commonalities between the different forms of this type of imagination are examined, it appears that the contexts evoked in each of these situations are distinctly social in that they involve the evaluation, reasoning, or evaluation of actions and events. Which includes

Table 5. Description, analysis, and interpretation of architectural examples and identification of types of linguistic, narrative, representational, material, and metabolist imagination. Source: Authors.

| Row | Imagination | Type of analysis | Analysis and interpretation | Picture | Architect | Example |
|---|---|---|---|---|---|---|
| 1 | Linguistic Imagination | -Conceptual (the manifestation of Chomsky's linguistic concept, turning architecture into a language, for a deep understanding of functions, structure and form) | -His Ph.D. degree in architecture: a sign of his interest in research and criticism in addition to the profession of architecture.<br>- Connection with philosophy: connection of his works with productive or transforming grammar<br>- A dimension of linguistics in which syntax rules take on a new meaning: (combining this idea with architecture)<br>-Tom Wolfe: Eisenman's genius in using the relatively clear words of the special language of linguistics (Hellman, 2000, 6). |  | Peter Eisenman (1970) | House II- America |
| | | Architect: "... what meaning and role they [houses] had in the critical culture of architecture evolved. Therefore, while this work used syntax and grammar, it sought to understand the analogical relationship between language and architecture. And of course, this is when I started working with Jacques Derrida." (Ansari, 2013) | | | | |
| 2 | Narrative Imagination | -Visual (the building is half of the church of San Carlino, which is made of wood.)<br>-Comparative (narrative of architectural history, symbolic narrative, and context dialogue)<br>-Materiality (wood materials and references to historical monuments) | -It is a new narrative and refers to an event and an influential personality in history<br>-With the use of wood, this building has become not a repetitive narrative but an outstanding work.<br>-Regardless of whether the narrative of the architect is fiction or non-fiction, it is an architectural work that speaks like a text and forces the audience to identify the story in the heart of the work and read it. |  | Mario Botta (1999) | Borromini's Memorial - Switzerland |
| | | Architect: "Buildings in modern cities have lost their metaphorical aspect. Today's contemporary architecture is very scattered and crowded outside; Like a skin or a skull, but you don't know what's inside." (Botta; 2023) | | | | |
| 3 | Representational Imagination | -Visual (2D and 3D sketches of the design) | -The way of seeing drawings in imaginative mode leads the audience to surprising conclusions about the understanding of architecture as an aesthetic device.<br>-The representation format of drawings - sketchy plan and perspective view - is not just a way of representation; it is a work environment. |  | Bjarke Ingels (2010) | House Eight - Denmark |
| | | Architect: "All comic books take place in artificial environments, and I was very good at drawing people and animals and things like that, but I hadn't put a lot of energy into designing buildings. so, I thought maybe I could be an architect, and I became one. .... Now I am more interested in stories, how maps and layouts can help tell stories. " (DB, 2012) | | | | |
| 4 | Material Imagination | -Visual (demographic architecture and the bold role of materials in it)<br>-Materiality (desire to use materials appropriate to the subject)<br>-Contextual (Gehry's childhood memories of the fish market and memories of touching fish scales: choosing titanium metal for the project) | -An outstanding example of the use of titanium<br>-Imagination and discovery of expressive capabilities of new materials and its application and decisive role in the design product in this work<br>-Imagination about materials is always in the best way in Gehry's works; with the work Gehry did on his house in 1970, a series of different styles using various materials and geometric shapes, galvanized metal, corrugated steel, planks, exposed cement and especially chain-like lattices, was emphasized (Hellman, 2000, 68). |  | Frank Gehry (1997) | Guggenheim Museum - Spain |
| | | Architect: "I found the materials that people hated the most and used the most. So, I wanted to see if I could play with it in a sculptural way. ... and I realized, when I walked into meetings with these metal things, people would just look at me ... but I can't do anything else. This was my response to people and time." (Jencks & Kropf, 2006, 111) | | | | |

Rest of Table 5. Description, analysis, and interpretation of architectural examples and identification of types of linguistic, narrative, representational, material, and metabolist imagination. Source: Authors.

| Row | Imagination | Type of analysis | Analysis and interpretation | Picture | Architect | Example |
|---|---|---|---|---|---|---|
| 5 | Metabolist Imagination | -Contextual (representing the comprehensive philosophy of architecture and the future vision of society)<br>-Functional (contemporary individualism and representation in architecture)<br>-Visual (capsule form, a symbol of modern lifestyle) | -People will gradually lose their desire for possessions such as land and large houses, and will begin to value opportunities and means of free movement.<br>-An expressive capsule of a "highly autonomous asylum", "determined by the free will of individuals", where "the inhabitant can fully develop his individuality" (Gardner, 2020, 35) |  | Kisho Kurokawa (1972) | Capsule Tower Building - Japan |
| | | Architect: "The architecture of metabolism was based on the image of a living cell. This image includes the concepts of growth, division, exchange, transformation, independent parts, deconstruction, temporality, recycling, loops, and dynamic stability. (Russell, 2009, 247). | | | | |

a person or more entities; To the extent that this category of imagination can be considered social, even though the title is not very accurate. In a quote usually attributed to Leonardo da Vinci; "A work of art is never finished, it is simply abandoned"; Elements inherent in imaginative processes are mentioned in this category: such as novelty, open-ended less, discovery, and generation. When one's imagination is focused beyond "what was" and "what is" and expands to "what could be" or "what could be," the space of possibility is significantly wider, and this is true across fields such as art and science (Abraham, 2016, 4205).

Examples can be seen in linguistic, narrative, and even in representational imagination. Concepts that belong to the category of Novel combinatorial forms of the imagination include creativity in problem-solving and expression, divergent thinking, counterfactual reasoning, hypotheses generation, and hypothetical reasoning (Abraham & Bubic, 2015, 15). Both intention-based and novel combinatorial forms of imagination processes are reconstructive, but intentional or collective imagination processes are when the context involves piecing together information from existing knowledge to find the best explanation, expression, or solution. In contrast, novel combinatorial processes of imagination are active when the context involves moving beyond existing knowledge to find new explanations, expressions, or solutions. Similarly, it is expected that mental imagery is more or less dependent on the needs of the context compared to other aspects of imagination. Novelist Jerzy Kosiński states that "the essence of true art is not to depict, but to evoke," pointing to a fundamental characteristic shared by all art forms: that a work of art is designed to evoke a response. But what happens about the cognitive response evoked when understanding an architectural work; is that the individual's experience is not one-dimensional. However: One experiences complex sensory phenomenological states that are subjective and cannot be fully explained by the sensory characteristics of the architectural work alone (Abraham, 2016, 4205). As for the excitement of the work of art, we can mention emotion. Physical environments affect people through emotional impact. The pleasantness of the emotional quality of the experience, arousal, the issue of physical activity and mental alertness, and the dominance of the feeling of control or its absence are the three main components of the definition provided by Mehrabian and Russell (Mehrabian, 1978, 1105-1117). Features related to visual aesthetics or, in general, perceptions that can be related to art and literature can be identified in embodied imagination and material imagination.

## Conclusion

Architectural imagination is a concept that has been paid little attention to; An element that has not had a place in academic and professional education and has not been cultivated. The productive and constructive role of imagination is very influential on architecture and innovation in architecture; in such a way, the architect can present an innovative plan by combining the images in his mind as well as his imagination of the future. The components that form the designer's imagination are memories, lived experiences, mental images, beliefs, etc. On the other hand, the design process is not a step-by-step and linear process, but a continuous and back-and-forth flow that is formed with the utmost complexity in the designer's mind. Each type of architectural imagination, in degrees of image in the architect's mind, becomes a response and finally forms the product of imagination. Personal, collective, ethical, ecological, embodied, linguistic, narrative, representational, material and metabolist imagination are types of imagination that were investigated in several works. Each architectural work, by knowing and then analyzing its various aspects, was attributed to a type of imagination that the architect used in creating that work. Finally, in addition to identifying the type of imagination, its role in the design of architectural work was discussed based on the neurophilosophy perspective. In this framework, processes related to imagination can be placed in 4 main categories. personal imagination in the category of " Mental imagery-based forms of the imagination", collective imagination, ethical imagination, ecological imagination, and metabolist imagination in the category of " Intentionality-based forms of the imagination", linguistic imagination, narrative imagination, and representational imagination in the category of " Novel combinatorial forms of the imagination" and embodied imagination and material imagination are included in the category of " Phenomenology-based forms of the imagination". The product of imagination evokes the world of thoughts and imagination of the users and invites them inside. Architecture can be original and lasting, which is the representing presence inside. Based on this, knowing the process of architectural design and explaining the role of imagination in it can be authentic; A process that originates from the imagination of the designer and captures the imagination of the user. Table 6 shows the interpretations of the types of imagination along with the type of imagination and matching with the role of imagination from the neurophilosophy perspective.

## Appreciation

This paper is extracted from the Ph.D. class project entitled "The Foundations of Space Form" under the supervision of the corresponding author whose cooperation is appreciated.

Rest of Table 6. The type of imagination in architectural examples and its role based on the neurophilosophy perspective. Source: Authors.

| The role of imagination | Interpretation of imagination | Imagination |
|---|---|---|
| Mental imagery | Real architecture doesn't just come from a logical focus on technical solutions; rather, they arise from the complex dialogue of personal imaginations and limitations and potentials. | Personal Imagination |
| Intentionality (recollective) | Collective imagination is essential for architects along with individual and professional roles. Such a role requires architects to become concerned people who strive not only for their ideas, but also for the well-being of citizens. | Collective Imagination |
| | A lack of ethical imagination can lead to designs that are insensitive to cultural contexts. Hannah Arendt describes: "Imagination alone enables us to see things in perspective...without this kind of imagination, we are never able to understand our place in the world." (Arendt, 2020, 37-62) | Ethical Imagination |
| | Since the late 1960s, there has been a growing tendency to adopt a moral stance not only towards individuals but towards the vulnerable ecosystem of the entire earth. Living in relative harmony with natural environments is one of the foundations of this imagination (Landrum, 2016, 74). This imagination considers buildings and human actions as interrelated elements in an ecosystem, including personal and collective will. | Ecological Imagination |
| | The devastation of World War II created utopian imaginations. In Japan, a group of architects and science fiction writers used this space to begin a renaissance of urban design. The Metabolism movement is a fiction about Japanese cities emerging in the post-war era (Gardner, 2020, 35). | Metabolist Imagination |
| Phenomenology (emotion) | In architecture, imagination is a fully embodied experience. Merleau-Ponty showed how "the senses communicate." (Merleau-Ponty, 2012). Beyond the physical senses, the architectural imagination contemplates embodied dwelling, which requires the interrelationship of physical, spatial, spatial, and corporeal imagination (Landrum, 2016, 75). | Embodied Imagination |
| | Sometimes, it is assumed that architects first imagine the forms and later manifest them in the materials. Imagining architecture and matter offers countless ways to think not only about materials but also about beginning through and with materials. Materials are not just clothes on ideas; rather, as Paul Emmon explains in his article, the embodiment of architecture is "the real co-presence of meaning and material" (Landrum, 2016, 77). | Material Imagination |
| Novel combinatorial (generative) | If we consider imagination from an angle, the result of verbal discourse with oneself and others, the product of imagination can be the words of the architect's linguistic communication with his audience. Through their work, architects make promises, shape goals, and participate in creating collective events. It is a product of architectural imagination that can at the same time become a common language among people to shape a new future (Pallasmaa, 2011, 47). | Linguistic Imagination |
| | From Eisenman's point of view, an architectural work should come to life like a writing in its formation process; He believes in designing an open final work and not a clear and finished one. Referring to the presence of an absent existence in the design, he thought of architecture as a text, he believes that this absent presence comes to life in the layers of architecture (Karimzadeh et al., 2018, p. 90). Linguistic imagination is close to narrative imagination. An architectural plan is an arrangement of interconnected spaces that are organized in relation to specific contexts. | Narrative Imagination |
| | Good architects may tell stories, but in the architectural profession, narratives are combined with words and images. Through various graphic, digital, performative, and material tools, architects imaginatively interpret, recover and revise world projects that are not only buildable and habitable but also desirable (Frascari et al., 2007, 26). Depicting human ideals in different periods has caused these representations to be a model for implementing those ideals in the following decades. | Representational Imagination |

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