Explaining the Methods of Architecture Representation Using Semiotic Analysis
(Umberto Eco's Theory of Architecture Codes)

[1*]Seyed Mojtaba Shojaee, [2]Seyed Ali Akbar Saremi

[1]Ph.D student of Architecture, Faculty of Art and Architecture, Islamic Azad Universty, Tehran Center Branch, Tehran, Iran.
[2]Associated Professor of Architecture, Faculty of Art and Architecture, Islamic Azad Universty, Tehran Center Branch, Tehran, Iran.

ABSTRACT: In this paper, it is tried to explain the concept of representation and architectural representation through a qualitative methodology, approach its procedure for gradual creation in architecture and then according to scholars and to obtain the effect of this concept in the process of architectural facts the concepts are presented. In addition, it is referred to theories and practical texts by philosophers, and archaeologists and architects who have spoken about the architectural representation, and its definitions are also provided from the perspective of semiotics. Then through a deductive view aiming to clarify the fundamental differences between types of architectural representation and according to the presented ideas, three fundamental roles in the representation of architecture as mimesis and imitation, architectural representation as abstraction and architectural representation as simulation are described and examples are cited for each of them. In the end, by a qualitative methodology and with an interpretive approach using the theory of Umberto Eco in architectural codes, the comparative tables are provided, and to clarify the relationship between the three methods of representation and the procedure of their ideas on the formation of the architectural reality are analyzed through the semiotic approach. Finally, these comparative tables are separately classified in three groups of three so a variety of architectural representation techniques in diverse historical periods in architecture are explained as a result of this research.

Keywords: Architectural representation, Semiotics, Imitation and mimesis, Abstraction, Simulation.

INTRODUCTION

In view of modern and post-modern empirical science contemporary man sees the universe not only through images but also past and future men look from the perspective of the images that have constructed for themselves. Other people expand this pictorial image, which Heidegger has noted, and remark that: In fact the main asset in every era are the image and the mental image behind it out of the world and its nature, and it is the image that holds the clue of all notions and with a little investigation it can be seen that modern-age wisdom, like the wisdom of each of the earlier ages, has its own vision of the world (Burtt, 1990). In view of new science, in theorizing and with quantitative and statistical formats, visualizing of phenomena does not end but all the calculations are for man to dominate the forces of nature. It can be said that the methods of modern science refer to the pursuit of nature, trapping and mastering it as an ordered set of calculated forces (Heidegger, 2014).

In the search for the meaning in the built environment, Rapoport takes three methods of linguistics and semiotics, behavioural approaches and symbolism into his consideration (Rapoport, 2005). In fact semiotics, as one of the methods of text analysis, analyzes text analysis as a structured totality and searches the hidden and implied meaning. Semiotic studies focus on the rules that dominate the discourse involved in texts and emphasizes the role of semiotic context in shaping sense (Chandler, 2007). The purpose of this paper is to investigate and explain the exact representation of the architectural methods using semiotic analysis by Umberto Eco's theory in architectural codes, so through this view, it can argue serious differences in methods of architectural meaning.

*Corresponding Author Email: *Arc.Payam@gmail.com*

Statement of the Problem

Semiotics as root science of linguistics and as a general knowledge of signs and sign systems can play one of the most important roles for the recognition of the meaning of things. Semiotics is concerned with everything that can be considered a sign (Eco, 2014). From the perspective of semiotics, signs can appear in the form of words, images, sounds, gestures and objects. Contemporary semioticians do not study signs in an isolated way but rather to review them as part of their sign systems. They are looking for answers to these questions that how meanings are made and how facts are presented. In fact, semiotics in many forms is associated with the production of meaning and representation (Chandler, 2007).

Architecture is the art of making space (Weinel, 1982). Fundamentally controversial, space making can be rooted in physicality, something tangible like a boundary; form logically is driven based on tectonics[1] or derived from Classical architecture, to name a few. Durand argues that structural reasoning comes from the economy and that the goal of architecture comes from "public and private usefulness (Fig.1). Laugier & Wale (1755) in contrast suggests the order of architecture comes from the three necessary elements: column, floor and roof, and functionality (Fig. 2).

The wide variety of spatial ideas between the fundamental reasons for building methods, either social or formal, show that the rationalization of space is constrained in how it is represented. To critically examine how one represents architecture, the meaning and purpose of representation must be questioned.

A broad range of spatial and formal ideas is formed regarding its basic reasons for creating images in architecture and discovering methods of making them which indicates the dependence of architectural space logic to limitations of "Architectural Representation ", so to investigate a representation, its meaning and purpose must also always be questioned and examined and with regard to the idea of interest the capacity of architectural representations can be figured out and use their meanings for subsequent representation. Statement of the problem of this article is about how to create a classification system to explain the method of architectural representation in different periods to be able to analyze their role in the formation of its architectural reality.
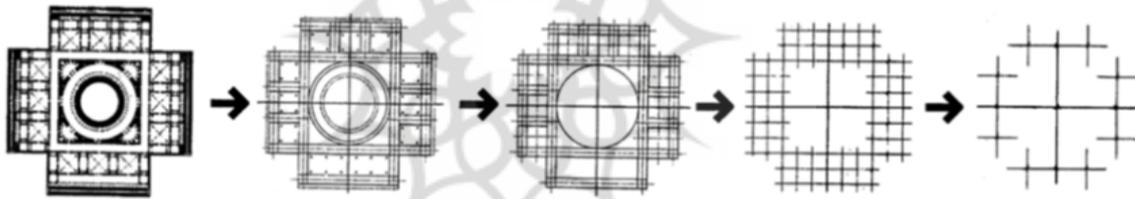

Fig.1: Method of composition in the order proposed by Durand (Source: Madrazo, 1994)

Fig.2: The primitive hut for Vitruvian man (Source: Laugier & Wale, 1755)

This study is necessary because of the centrality of the issue from the perspective of semiotics representation of this science has not been studied significantly. If the sense of architecture as a collection of texts, images and spaces, comments should necessarily take into semiotics and various species of it and of its achievements. Names in this paper and in the number of indications about the codes of contemporary architectural theory as theory basis Umberto Eco is selected. His views on contemporary thought are closer time periods as well as the number of signs that semioticians have written about of architectural representation texts are very few.

MATERIALS AND METHODS

In general, qualitative research is concerned with the data which display and analyze the studied facts in the form of verbal, visual or the like. Using several methods, qualitative research is done based on interpretive and naturalistic approach (Bazargan, 2008). The main feature of this type of research is the deductive approach and analysis of deep interviews aimed at identifying the main issues, the exact method of encoding foundation and combines the results, and finally compile them into a coherent article that requires an interactive and long-term process. The article extracted from this type of research, while addressing the main points from the interview comments, documents these points with expressive quotes from the respondents. Qualitative research method has multiple nature which encompasses the interpretive and nature-oriented approach of the subject. This means that qualitative researchers study phenomena in their natural environment and their efforts are to understand and interpret phenomena in terms of meaning intended to people. Qualitative research involves the use of conscious and collecting a set of experimental data (Denzin & Lincoln, 1994).

In this paper, three qualitative research approach, including the underlying theory, ethnography and interpretivism are examined. In underlying theories, Rapoport, Beto and Broadbent's theories have been used and in the ethnographic section, in addition to the view of Archer, Hodder and Perez Gomez, known and documented examples of historic architecture - according to their chronological order- are used in order to achieve a kind of time classification. In this article, interpretivism is based on the theories of a semiotic and analytical look of Umberto Eco to the architectural codes, and Arthur Asa Berger's ideas about the semiotic analysis of media. The research was conducted in three stages. In the first stage in order to be careful in the research topic and the necessary coordination of the researcher with the research filed, exploratory research is carried out through desk research. in the second phase, which is the observation, three components i.e. discovering the meaning, understanding the relationship between phenomena and identifying critical points in research filed are assessed in the study and in the third phase that is simultaneous interpretation beliefs and behaviour of respondents, Data analysis is finalized and model analysis are

developed and designed (Denzin & Lincoln, 1994).

Literature Review
What is Representation?

To clarify the linguistic concept of representation, it is better to begin from its roots and origins which has similarities with its contemporary concept semantically. According to the etymology of words, In Greek, the term "mimesis" is derived from the word "mimeisthai" meaning imitation which originally meant representation of heroes in Greek mythology called Dionysian Cult Drama (Gebauer & Wulf, 1996). In ancient Greek, before Plato period, different meaning has been taken out of this term and its central meaning is Imitation, Representation and Expression. Plato added other meaning to this word in his philosophical ideas that the most important ones are: imagination, transformation and creating similarity (Gebauer & Wulf, 1996).

In Arabic and Persian, the equivalent of mimesis was used for the Greek word mimesis. Imitation as a word means indicating together, indicating someone's quote or deed without excess and deficiency, Iteration, quoting someone's exact statement or becoming someone or a thing (Dehkhoda, 1994, mimesis explanation). Interestingly, also in English For a more accurate understanding of what is called mimesis in Greek, Often the term "representation" is used as representing and display as it further helps the correct Platonic consideration (Shafiee Kadkani, 2001).

Representation from Semiotics Point of View

While semiotics often deals with forms of text analysis, at the same time it may include the philosophical theory of signs and their role in the construction of reality and that is why for semioticians, the study of representations and representational processes have particular importance to always see the construction of reality in a more realistic representation of the way. One of the distinguishing features of semiotics is that they follow representation in the other things and search for their proportion with reality. For instance, in a design or image, all the words and expressions are excluded that can be considered as an advantage in their own way. The nature of the real world cannot be imagined in terms of language and referring to their descriptions (Burr, 1995). Representation forms the crucial aspect of any visual and designed-based knowledge. The purpose of representation is the relationship between an idea with the display process of thinking and its design. This subject is multi-faceted in the representation of architecture that has always been evolved in the past and with a concentration of perception circumstances, and with the combination of architectural ideas, plays an important role in Understanding and experience of architectural works.

Architectural Representation from Semiotics Point of View

Architects do not build buildings, they make the drawings and models from which buildings are made. The medium

in which each work is intimately tied to the thing that is produced, they are inseparable (Simitch & Warke, 2014). An important point mentioned in the sentence above means that today there is no escaping from the architectural representation as an achievement to explain architecture. Architectural representation is the presentation methods of the architect's idea to facilitate the understanding and then construct the architectural work since the buildings are not built by the architects anymore. In its definition, representation is the description, expression or determination of role by phrases, words, characters or symbols which are able to make a mental picture (Simitch & Warke, 2014).

All areas affected by the essence of a project designed - whether built or not - are made of representation by nature. These sections are the parts and layers of the same principles and origins which are in the forms of the compounds represented and influenced by the condition of empirical and physical perception of the work. In fact, representation is used as a focal point for architects and to create a Language-like dialogue in the design process. Choosing a type of representation since the time of choice impact, compared to other options, significantly affect the outcomes of the project (De la puerta, 1997).

According to the Ferdinand de Saussure's theory, it can be considered that in different built architectural space, their corpus is the signifier and the space created is the signified which totally forms an architectural sign and what distinguishes these sign from one another is the difference in their semiotic aspects that makes the sign distinction while interacting with each other (Fig. 3)

The Role of Architectural Representation

Based on the above-mentioned interpretations in describing the architectural representation, today, this concept, with at least three methods and titles in different periods, has managed to play a role in the architectural ideas, turn them into reality and has each of the following methods in its role as simple or compound. They are described in details as follows.

Architectural Representation as imitation and mimesis:
Mimesis and imitation from reality and kinds of its presentations were the valuable aims for artists and architects for addressing the truth. For Achieving this aim they use from colours, textures, light and shades in their models and pictures. to be a representation there must first be something to correspond to, an original. In addition, for representation to be presented to the mind, it must be capable of being perceived. Clearly stated, before something can be represented- it must exist and it must be real (Akin & Weinel, 1982).

Representation refers to the concept of indicant or indicative something or repeating the presence of one another. Due to the fact that references of the concept of representation are by far wider than the reference of the concept of imitation or mimesis, this term is an appropriate alternative for imitation (Shafiee Kadkani, 2001).

Charles Batteux, the French theorist, in 1746 wrote an important treatise titled "Beautiful art, delivered to the main unit" under the influence of the ideas of John Locke and Fracois Marie Arouet Voltaire. Arts which Batteux included in his epistle are poetry, dance, music, theatre and sculpture. This classification caused fine arts, separated from industries and various scientific and philosophical fields such as mathematics, astronomy, logic, ethics, physics and chemistry, allocate certain headlines to their own and become eligible for overall Concept of Art. Batteux tended to say he did not classify fine arts at random or in an arbitrary way but fine arts are classified based on a principle which they all have it in common. This principle was imitation (mimesis) (Young, 2015).

In the following local traditional house styles have not declined but instead have flourished while adapting to new circumstances. It demonstrates a certain continuity of the symbolic spaces despite differences in beliefs and related issues so far and emphasizes the imitative aspect of man's primary representation. In the earliest days of human settlement, one of the most important architectural representations methods can be found in the imitation of nature (Archer, 1971).
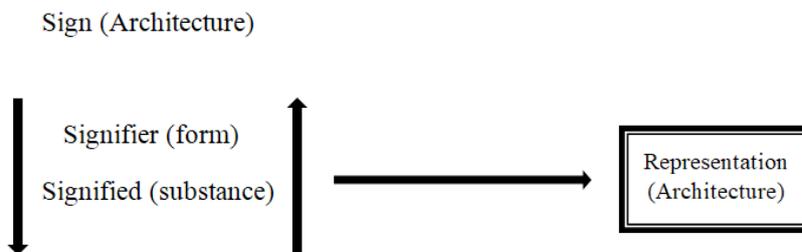

Fig. 3: The first signifier and signified of architecture from the perspective of semiotics (Source: De Saussure, 1995)

Hodder defined three concepts which he thought were central to the European Neolithic: 'Domus' (place and practice of nurture, control, symbolic elaboration and power relations focusing on the house); 'Agrios' (field, outside, wild); and 'Foris' (the doorway with the outside) (Fig. 4).

The house as matter and concept was tied to the forces of social reproduction and articulated oppositions to the wild, the dangerous and the unsocial. The wild and dangerous were 'foregrounded' within the Domus; Wild animals and wild plants were also brought into the domain of the Domus, where

they could control and tamed. The Domus was now a metaphor for the domestication of society.

The houses of the Linear Pottery Culture in central Europe (fifth millennium BC)

embody a new variation on the Domus theme for Hodder. Their monumental size, deep interiors, linear grading of space and boundaries for houses and communal enclosures are linked as aspects of 'foris' (Fig. 5). Hodder interprets these developments as indicative of the creation of links and dependencies with neighbours and 'foreign' groups (Hodder, 1984).
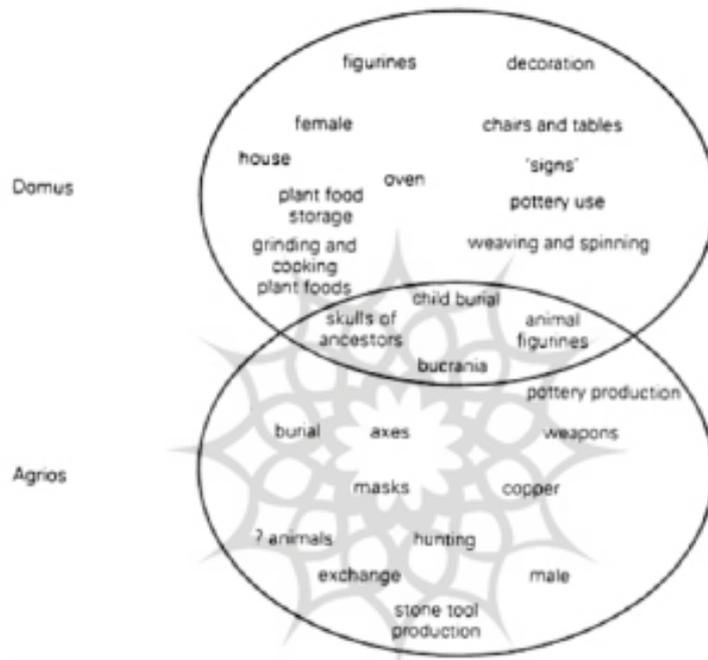

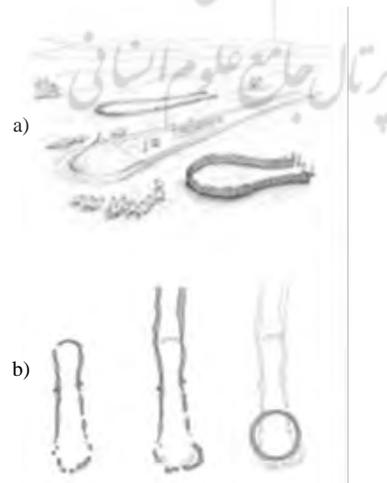Fig. 4: Associations of the Domus and Agrios in south-east Europe (Source: Hodder, 1990)

Fig. 5: Cerny, France: (a) view; (b) development over time (Source: Constantin, Mordant, & Simonin, 1997)

Architectural representation as abstraction[2]: Broadbent comes out firmly against the religious theory of architectural origins: 'It seems fairly certain then, that man's first impulses to build were purely utilitarian and that attempts to 'prove' his first buildings were symbolic are so much wishful thinking which is not to deny in any way the importance of buildings as symbols once a capacity for abstract thought had developed' (Broadbent, 2009).

After the Renaissance, Our implicit trust in the application of a scientific methodology to architecture derives directly from the techniques prescribed by Jacques Nicolas Louis Durand in his PrPcis des Lecons dl Architecture (1802 and 1813). Durand's legacy is the objectification of style and technique, and the establishment of apparently irreconcilable alternatives: technological construction (functional) versus artistic architecture (formal), the false dichotomy of necessary structure and contingent ornament (Pérez-Gómez& Pelletier, 1992).

To create a perspective, the artists of the Renaissance abstracted themselves from the experienced world; the geometrization of depth in painting was a sign of an increasing rationalization of perception in general. This view was a kind of transition from a natural perspective abstract perspective (Fig. 5).

Architectural representation as simulation: While descriptive geometry attempted a precise coincidence between the representation and the object, modern art remained fascinated by the enigmatic distance between the reality of the world and its projection.

In this period, we witnessed the improvement of aspects of the design which were not taken seriously until the nineteenth century such as unknown aspects of descriptive and perceptual experiences which were invisible until then. In this sense, architectural projects are not substitutes and imitations for something else. They do not have any connotation except

emphasizing the dominant power structures and images that they speak about (Pérez Gómez & Pelletier,1992).

A simulation is something that "imitates the appearance or character of something (Akin and Weinel,1997). According to contemporary philosopher Jean Baudrillard, fascination of society in simulating the process which image replaces reality, is though symbols and signs. Through this image, the separation of reality is so hard fact as if somehow simulation is complete. While we know this simulation does not represent the principles and the facts and has no natural connection with them.

When projections function as surrogates of buildings, when sets of drawings attempt to provide us with a "picture" of an architectural place or object, the buildings produced by such techniques must necessarily reflect the predictive quality of their conception: the possibility of a revelatory dimension is abandoned and the actualization of the architect's imagination will inevitably be lost in the translation. That this assumption of a literal relationship between the project and the building is basic to industrial production in the modern city makes a critical reassessment of this issue all the more pressing (Pérez Gómez & Pelletier,1992). (Fig. 6 and Fig. 7)

His last oil on canvas, **Tu m'**(1918), is a recapitulation of all the perspectivist deceits allowed by an opaque medium. It is his most explicit study on anamorphosis, the perspectival distortions that writers of the early seventeenth century believed dangerous in their capacity to manipulate and change the given appearance of the world. In **Tu m'** Duchamp questions the distinction between appearance and apparition. The painting is constructed as an anamorphosis, though in contrast to all traditional works of this kind, the truth of the image is no longer revealed to the beholder from a fixed position. As one walks around it, certain elements of the composition become visible, while others vanish (ibid). (Fig. 8)

In the Morphosis office, the compounding of forms was

Fig. 6: Michelangelo's Study of Fortifications model the walls as sculpted surfaces (Source: Simitch & Warke, 2014)
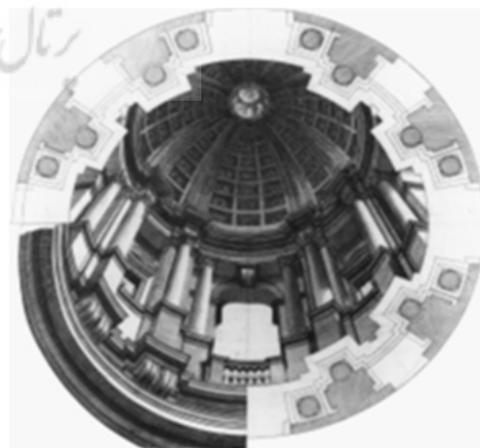

Fig.7: Fresco with trompe l'œil dome painted on low vaulting, Jesuit Church, Vienna, Austria,1707 (Source: University of Reading, 2008)
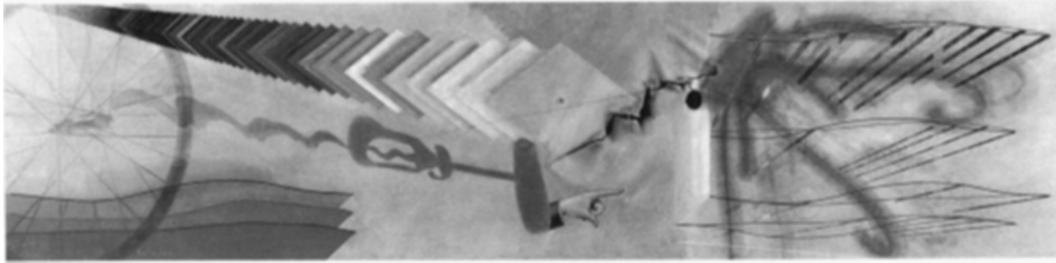
Fig. 8: Marcel Duchamp, Tu m', 1918. Oil on canvas with brush attached, 69,8×313 cm. Photograph: Joseph Szaszfai. Yale University Art Gallery, bequest of Katherine S. Dreier. (Source: Naumann& Duchamp, 1982)

achieved largely through the transparency of paper and Mylar: drawings were layered, occasionally even combining various formats of drawings leaving remnants of an oblique in plan, of a plan in elevation, just as the components of a building might be merged into a larger complex. In other words, representation in various media becomes a creative, vital, and organic process that leads both to the development of a design and the speculative exploration of a project's extended possibilities. For Morphosis, representation is the architect's principal experience of a building (Simitch & Warke, 2014).

Thus, the contemporary theorists willing to acknowledge that the materiality of sign is a signifier itself and sign is considered a phenomenon in the outer world. All signs are of a material embodiment, whether it is a sound, or physical object or color, or body movement or even a similarity (Voloshinov,1973).

(Fig.9 and Fig. 10)

Semiotic Analysis of Architectural Representation Methods

In general it can be said that three types of semiotic analysis technique has been used. Signs and relationships, are two key concepts in semiotic analysis. Relationships are more important than the objects and signs because the creation of meaning is done only by establishing the relationships among objects. In language system everything is dependent on the relationships. No sign is meant by itself but its value is due to its connection with other signs (Sojoudi, 2011). To discover the hidden meaning, there are practical and technical methods which they all investigate the signs and their relationships. (Fig. 11)

Fig. 9: Perot Museum of Nature and Science: Giclee Print, 2009
Thom Mayne with Kerenza Harris; Jack Duganne (Printmaker)
and Jeff Wasserman (Serigrapher)
(Source: Simitch & Warke , 2014)

Fig. 10 : Penang Turf Club Masterplan, 2004 Study Model, Morphosis (Source: Simitch & Warke , 2014)

RESULTS AND DISCUSSION
Synchronic Analysis (Paradigmatic Structure) and Diachronic Analysis

(Syntagmatic Structure); so synchronic study of a text focuses on relationship between its components and diachronic study pays attention to the procedure of narrative evolution. In this analysis, the principle is laid on binary oppositions such as nature and culture, life and death, superstructure and infrastructure (Sojoudi, 2011).

Intertextual analysis; simply means using the contents of the texts have already been created consciously or unconsciously in the new text. That what texts are involved in the intended text will guide us to a better understanding of the text (Berger, 2010).

Metaphor and Metonymy; are two ways to transfer meaning. In the metaphor, the relationship between two things arises by way of analogy and simulation is one the most common ways. In metonymy the relationship is based on the association (Berger, 2010).

Codes are highly complex forms of meaning association and we learn it in a certain society and culture. These codes or mysterious structures in our minds, impact on the interpretation of symptoms as well as our life styles. All media are subject to certain codes; These semiotic codes include hidden meanings which can be analyzed semiotically by cryptology technique of any media and literature. Over time, direct and implicit implications in architecture can have different interpretations,

Because the codes involved in architectural form and space are decoded based on environmental issues and time readings. Umberto Eco claims three categories of code in the Physic of architecture:

Technical Codes: Coding that refers to knowledge of Architectural Engineering (beams, columns, roof systems, screens and insulation and etc.) They include the initial architectural elements. In his opinion, in this code, there is no relationship of content.

Syntactic Codes: These code are from space codes and refers to positioning and the way architecture components are related. Social and cultural contract involved in forming these codes and architecture elements are put together based on a certain logic in syntagmatic relationship and create signification such as staircases relationship with the yard.

Semantic Codes: These codes are focusing on the secondary and implied signification of architecture. This is where the individual elements of architecture, in relation to one-to-one and implied implications, produce a deeper signification. Eco divides semantic codes into four types: a) The codes with primary function such as roofs, stairs, windows. b) The code which has secondary, implied function such as Facade, ventilator and frame. c) Codes which produce connotation of ideological settlement such as panjdari (five windowed room),
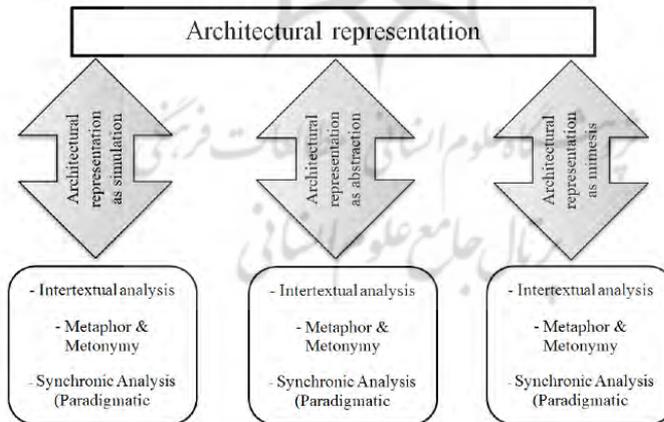

Fig. 11: First Architectural representation model on diversity of semiotic analysis.
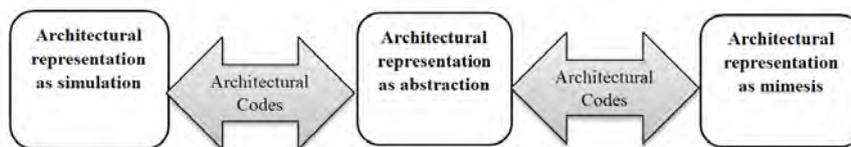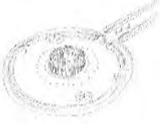

Fig. 12: Analysis mode between Architectural codes and Architectural representation on Eco's codes theory.

alcove and pool house. d) Codes which refer to other social types in a larger division such as apartments, traditional houses, aristocrat houses and schools (Eco, 1980).

As Eco noted as a linguist, architectural codes, unlike linguistic codes, do not supply a system of possible relations with various messages and due to functional properties of the architecture and standards involved, cannot provide infinite various and contradictory form together (ibid). (Fig.12)

Based on Eco's physical codes of architecture and three types of semiotic analysis we try to place together their attributes and features with examples according to the classification of three architectural representation methods with three analytical tables periodically and finally, with respect to this type of comparison, make clear and concise results in architectural representation to determine the objective capabilities. (Table 1 to Table 3)
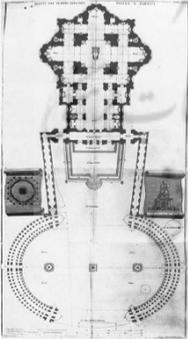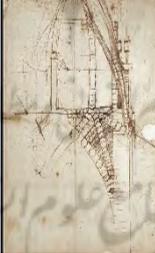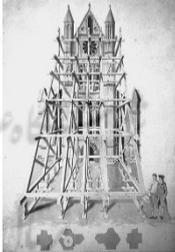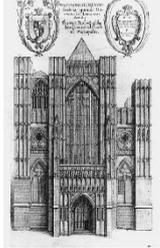
Table 1: Eco's semiotic analysis of architectural codes In the architectural representation as imitation and mimesis

	Technical Codes	Syntactic codes	Semantic codes			
			Primary function	Implicit function	Ideological function	Social function
	(Primary architectural elements such as a beam, column, wall, etc.) Fig.13: Typical Haida house. (Source: Jarzombek, 2013)	(Communication and spatial elements) Fig.14: general territory showing archaeological sites; possible reconstruction; (Source: Jarzombek, 2013)	(Roofs, stairs, windows, etc.) Fig.15: Ifugao, Philippines house; plan, (Source: Jarzombek, 2013)	(Facade, ventilator, etc.) Fig.16: typical southeast ceremonial area. (Source: Jarzombek, 2013)	(Alcove, living room, etc.) Fig.17: Stonehenge, England: aerial view Source: (Source: Jarzombek, 2013)	(Apartment, school, mosque, etc.) Figure18: Pawnee village, Kansas, USA. (Source: Jarzombek, 2013)
Synchronic & diachronic semiotic analysis (Paradigmatic & Syntagmatic)	- The contrast such as using stones against other unstable materials in construction - The order of strength of the technical elements in building or The order of materials, from stone to wood	-The contrast such as the river, watercourse against the mountains and deep valleys -The order of communication elements such as creating a path from the place of living to the hunting place as a safe way	The contrast-of meaning Like refuge in trees for safety against living in the territory of other organisms The order of architectural elements from the ground to the sky like construction the ceiling on the wall	The contrast of-meaning Such as natural and artificial mark on its territory The semantic order-of fields within its territory like a definition of territory and place of living based on the mastery of it	-The semantic contrast such as choosing a cave to settle against outside the cave -The semantic order of The hierarchy with The representation of cosmic forms like order in the semantic importance of the sun and moon	-The semantic contrast like tribal group living against sporadic group living -The semantic order of collective power like the hierarchy from the place of living to hunt or fighting place
Intertextual semiotic Analysis	-The impact on the concept of indoor and outdoor such as creating a frame by combining the basic technical elements against the unstable forms in nature	- The impact on the concept of near and far such as changes in the realm of living or fighting	- The impact on the concept of benefit by changing the technical elements to beneficial elements Like converting the column to the wall or vice versa	- The impact on the identifying the location such as turning the door to facade or symbol at the home of tribal elders	- The impact on the symbolic concept of elements such as turning the wall to the fence or fortification	- The impact on the social concept of home such as the construction of the first fort to identify safe biological limits

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Continiue of Table 1: Eco's semiotic analysis of architectural codes In the architectural representation as imitation and mimesis

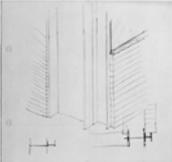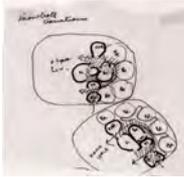| Technical Codes	Syntactic codes	Semantic codes			
		Primary function	Implicit function	Ideological function	Social function
Semiotic analysis of metaphor and allegory	- The apparent similarity with natural structure Such as constructing the horizontal elements for cover against natural changes -The proximity to the sky to represent the rules of construction on the ground such as constructing columns on the foundation	-The similarity with nature such as finding the first natural paths to use in a target location -The Proximity to the main elements of water, wind, earth and fire Such as creating the first path for burial	- The Similarities with basic shelter such as building roofs to define the scope of living -The proximity to fire to make required tools and heat such as making the first stoves at home	- The similarity with the indirect functions of architectural elements such as creating a pile on the ground to detect a location -The Proximity with others for the representation of the human role such as building a fence or wall to define the limits	- The Similarities with the customs derived from the collective beliefs coexist with nature such as primary similarity of the temples with mountains -The Proximity to circumstances of collective life such as creating the first room on the outside or inside a home	- The similarity with the dominant discourse by representations of nature such as the patriarch's house as a social place in the tribe -The proximity to the dominant discourse Like building a house together to create a stronger society

Table 2: Eco's semiotic analysis of architectural codes In the architectural representation as an abstraction

Technical Codes	Syntactic codes	Semantic codes			
		Primary function	Implicit function	Ideological function	Social function
(Primary architectural elements such as a beam, column, wall, etc.)	(Communication and spatial elements)	(Roofs, stairs, windows, etc.)	(facade, ventilator, etc.)	(Alcove, living room, etc.)	(Apartment, school, mosque, etc.)

Fig. 19: Filippo Brunelleschi, structure of the dome of Florence Cathedral, 1419–36 (Source: Harbison, 2009)

Fig. 20: St Peter's, Rome, plan showing Bernini's colonnade of 1656–67 (Source: Harbison, 2009)

Fig. 21: da Vinci, Leonardo *Codex Atlanticus studies for the tiburio of Milan Cathedral*. Milan, Italy. (Source: Smith, 2005)

Fig. 22: A representation of a view of the North front of the Cross Isle of Beverly Minster by John Yenn after N. Hawksmoor 1774. (Source: Jokilehto, 1986)

Fig. 23: Buonarroti, Michelangelo Base/molding profile studies for San Lorenzo (Basi di pilastro per la Sagrestia Nuova, scritte Autografe, Florence, Italy. (Source: Smith, 2005)

Figure24: Westminister Abbey before construction in the 17th century (Source: Harbison, 2009)

Continiue of Table 2: Eco's semiotic analysis of architectural codes In the architectural representation as an abstraction

	Technical Codes	Syntactic codes	Semantic codes			
			Primary function	Implicit function	Ideological function	Social function
Synchronic & diachronic semiotic analysis (Paradigmatic & Syntagmatic)	- A technical contrast in a broad and narrow representation such as the gradual enlargement of the apertures - The order of technical elements from hard to soft such as the use of materials according to their strength from outside to the inside of the building	-The contrast of articulation and the paths such as creating Foris and its gradual development in the building against the paths with no joint -The order of communication elements such as pause and move based on the response of the geometry to its needs	-The semantic contrast of utility in architectural elements such as ceiling height based on the function against the primary short ceilings - The order of architectural elements from the bottom to top such as creating architectural elements according to being under or on the work than the ground	The semantic contrast of The symbolic elements of architecture such as the semantic contrast of the inside and outside at home -The order of the architectural elements in a context such as the appearance of a pediment pattern in the form of home	-The semantic contrast of dominant and non-dominant such as representing the sense of domes and arches in the main hall of the building - The order of the value of public to private rooms such as a guest room or hall alcove at home	The semantic contrast of the house and city Such as building hospitals and museums in the city -The rate order of enjoyment of facilities such as using the education system for those close to power
Intertextual semiotic Analysis	- The impact on new meaning technical elements such as the composition of wall and beam, and the appearance of different kinds of arches	- The impact on the representation of the inside and outside such as the emergence of multi-functional spaces in the building	- The impact on the functional representation such as a load-bearing wall to wall separator	-The Intensifying of the symbolic meaning of power such as the construction of urban landmarks or triumphal arch	- The impact of representations of symbolic concepts Such as the pattern of the church in villas or edifices	- The emphasis on social values of the building such as changes in a church based on social issues
Semiotic analysis of metaphor and allegory	- A similarity with the structure of geometrical representation such as a representation of columns based on the geometric shape of a cylinder or truncated cone The proximity to empirical science for providing an adequate structure such as the simulation of technical proportions as an allegory of human proportions	- A similarity with regularity and geometric proportions such as the relationship between architecture and human body parts -The proximity to the older communication elements such as hall, the lobby at the entrance with the development of the old entrances	- A semantic similarity with common geometric shapes such as the building vestibule with a combination of geometric shapes - The semantic proximity to create a whole new meaning such as construction buttress and Gothic walls in highlands churches	-The semantic similarity of abstract conacepts of architecture based on the location and geography such as the semantic similarity between the words "arch" and "architecture" in Latin -The semantic proximity with the concepts and phrases in the language such as the vicinity of words four walls and houses in the language	- A semantic similarity with conventional ideological signs such as the similarity of word passageway with the function of the space in the building -The proximity to the ideological abstract meanings such as the vicinity of the domes and minarets in Islamic mosques or bell towers and pediment in churches	-The functional similarity of spaces required for community Such as functional similarity of schools and churches in Europe -The proximity to social meanings such as proximity of Aristocratic buildings with the government buildings in the city

Table 3: Eco's semiotic analysis of architectural codes in the architectural representation as simulation

Technical Codes	Syntactic codes	Semantic codes			
		Primary function	Implicit function	Ideological function	Social function
(Primary architectural elements such as a beam, column, wall, etc.)	(Communication and spatial elements)	(Roofs, stairs, windows, etc.)	(facade, ventilator, etc.)	(Alcove, living room, etc.)	(Apartment, school, mosque, etc.)
Fig. 25: Mies van der Rohe, IIT Minerals and Metals Research Building, Chicago, 1941. Preliminary sketch of a building corner. (Source: Mallgrave, 2005)	Fig. 26: Sketch plans for two Snowball Appliance Houses, 1957. Peter Smithson. (Source: Smith, 2005)	Fig. 27: Mies van der Rohe's sketch of the Brick Country House, aka Brick Country Villa,1923-24 (Source: Blaser, 1994)	Fig. 28: Sixth Street: Serigraph, 1988 Thom Mayne with Selwyn Ting and John Nichols Printmakers (Source: Simitch & Warke 2014)	Fig. 29: Aldo Rossi: Gallaratese II Housing, Milan, Italy 1974 (Source: Simitch & Warke 2014)	Fig. 30: Casa del Facsio,Giuseppe Terragni , Italy ,1932-1936 (Source: Frampton, 2007)
Synchronic & diachronic semiotic analysis (Paradigmatic & Syntagmatic) -The contrast of technical elements based on fabrication or pre-fabrication such as prefabrication of technical elements of the building in the factory at the same time -The order of technical elements from pre-fabrication to fabrication such as a chronological order of construction of architectural elements based on being either before or after the time	-The Static and dynamic contrast inside such as creating fluidity in space based on the composition of communication spaces with other spaces - The order of communication elements in order to create unity in space such as creating equal importance to the communication space and other spaces in modern architecture	-The semantic contrast in functional or decorative architectural elements such as using the minimum of architectural elements in apartments -The semantic order of architecture elements from the functional to decorative such as the use of basic elements without decoration based on the functional definitions	-The semantic contrast of Economic use of space such as minimal housing in the international style -The semantic order from the inside to outside space Such as the combination of a public, semi-public and semi-private sector in human habitat	-The semantic contrast of freedom and space monopoly on the use of space such as taking advantage of the Libre plan to use the building functionally in contrast to the traditional view -The semantic order of the outside to inside and vice versa to create a new perspective such as the use of glass walls or sliding windows in walls	-The semantic contrast of urban and rural life Such as Le Corbusier's residential project against his contemporary biological houses -The semantic order of individual to social life such as creating the urban public spaces next to a place of living
Intertextual semiotic Analysis - The impact on the concept of new technical elements such as creating new formal structures in architecture with the advancement of structural sciences	-The impact on the concept of relationship and movement such as creating value in all the spaces with Libre plan	- The impact on the concept of primary elements of architecture such as stairs or elevator importance in modern spaces Layout	-The impact on the concept of space with the title change Such as a bedroom or living at home or in a residential neighbourhood in the housing	- The impact on the ethical concepts in architecture and creating a new ideology such as the construction of similar buildings, with the international style	- The impact on the concept of the city and new urban neighbourhood such as the use of modern high-rise building in medium and large cities

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Continiue of Table 3: Eco's semiotic analysis of architectural codes in the architectural representation as simulation

	Technical Codes	Syntactic codes	Semantic codes			
			Primary function	Implicit function	Ideological function	Social function
Semiotic analysis of metaphor and allegory	- The apparent similarities with classical technical elements such as three-dimensional structure design	-The similarity with communication elements of the building in terms of simulation such as designing of work triangle in the kitchen	-The similarity with the aspects of the Pure and pristine environment such as rough surfaces in architectural elements	- The similarities with aspects intrinsic to the material and thematic structure of ancient architecture such as Wright works in the style of romanticism in the early twentieth century	- The Similarities with the basics and foundations of an abstract representation of architecture such as Mies van der Rohe design based on the principles of Greek temples	-The similarities with concepts inherited from architecture and urbanism such as The definition of new cities in a global view
	-The proximity to the environment and transparency of the technical elements such as the use of columns and beams as thin and impalpable	-The proximity of communication spaces with activity and pause spaces such as living room design based on its the communications and activities	-The proximity to technical elements such as combining elements of the first domino in Le Corbusier's model for the modern home	-The proximity of form and function in the design of architectural elements such as Le Corbusier's designs to image the proposed new functions in a home	-The proximity to the modern intellectual and philosophical principles such as modernist architects in the style of Futurism or Cubism	-The proximity to modern social lifestyle such as creating new social applications like hotels for temporary stay

Synchronic and Diachronic Analysis in Technical, Syntactic and Semantic Codes of Architecture

In this analysis which is formed based on binary opposition, the following results will be achieved.

Interpreted results of the mimesis and imitation: Contrast between stability and instability, contrast of right and misguided way, secure and insecure semantic contrast, legibility and illegibility contrast sense, meaning opposition of the inside and outside, the home and non-home (outer space contrast of meaning.

The order in the strength of technical elements, an order in the construction of communication elements, the order of architectural elements from the ground to the sky, the semantic order of fields in the territory, the semantic order of hierarchy, the semantic order of individual and collective power.

Interpreted results of abstraction: Broad and narrow technical contrasting according to the geometric proportions, articulation and path contrast, the semantic contrast of utility and symbolic, the semantic contrast of iconic elements of architecture with each other, the contrast of dominant and non-dominant sense, the semantic contrast of home and the city regarding the social development of monuments.

The order of technical elements from hard to soft, the order of communication elements, the order of construction of architectural elements from the bottom to up, the order of value of architectural elements in a context according to proportions and geometrical representations, the order of space in value from public to private, the order of the amount of facilities

enjoyment insider and outsider in the community.

Interpreted results of simulation: Technical elements contrast in architecture based on fabrication or pre-fabrication, static and dynamic contrast of space inside, contrastive meaning in functional or decorative architectural elements, contrastive meaning of economic use of space regarding their size, contrastive meaning of freedom and space monopoly on the use of space, contrastive meaning of urban and rural life to improve life quality.

The order of technical from capability of pre-fabrication to fabrication, the order of communication elements in order to create integration and equal value in space, the semantic order of architectural elements from functional to decorative, the semantic order from inside to outside space with formal compounds, the semantic order of outside to inside and vice versa to create a new vision and perspective in the building, the semantic order of individual to social life based on the qualities of life.

The intertextual analysis in technical, syntactic and semantic codes of architecture

Such analysis is created based on the effects of different texts on each other and making architectural representation.

Interpretation of results of the mimesis and imitation: The impact on the concept of covered and uncovered, the impact on the concept of near and far, the impact on the concept of utility, the impact on the identifying location, the impact on the symbolic concept of architectural elements, the impact on the social concept of home.

Analytical results of abstraction: The impact on new meaning of technical elements, the impact on the representation of the inside and outside based on the importance of communication spaces, the impact on the representation by converting technical elements to functional elements, intensifying the symbolic meaning of power, the impact of representations of symbolic concepts in terms of ethics and religion, The emphasis on social values of the building.

Analytical results of simulation: The impact on the concept of new technical elements, the impact on the concept of relationship and movement, the importance of increased communication spaces, the impact on the concept of the primary architectural elements and their new arrangement based on their functional significance, the impact on the concept of space by changing the titles of spaces according to their new function, the impact on the moral concepts in architecture and creating a new ideology in the construction of space based on modern values, the impact on the concept of the city and new urban neighborhood to change the style of social life.

The Analysis of Metaphor and Allegory in Technical, Syntactic and Semantic Codes of Architecture

In such an analysis, the effects of similarities and proximities in architectural representation are considered and in this respect, they create a new kind of classification:

Analytical results of mimesis and imitation: The apparent similarity with a natural structure, the similarity with normal communication, similarities with basic shelter for the definition of security, the similarity with indirect functions architectural elements, the similarity and proximity to collective dominant discourse.

Proximity to the sky with the rules of construction on the ground, proximity to the main elements of water, wind, earth and fire, the proximity to fire to make required tools and heat, proximity to one another, the proximity to circumstances of collective daily lives.

Analytical results of abstraction: The similarity with the representation structure of geometry, the similarities with order and geometry proportions constructed in nature, the semantic similarity with common geometric shapes to create a new function, the semantic similarity with linguistic concepts based on the location and geography, the semantic similarity with conventional ideological motifs, the similarity of some of the required functions of society together.

Proximity to the empirical sciences to achieve a more appropriate structure, proximity to older communication elements to create new communication elements, semantic proximity of architectural elements together to create a new uniformity, proximity to the concepts and phrases in the language, proximity to abstract ideological meanings,

proximity to urban and social meaning in architecture based on their proximity to power.

Analytical results of simulation: The apparent similarity with elements of classical technique, the similarity with communication elements of the building, similarity with aspects of pure and pristine environment by new architectural elements, similarity with inherent aspects of materials and thematic structure of ancient architecture, the similarity with the basics of abstract representation of architecture, the similarities with concepts inherited from classical architecture and urbanism and generalizing them in social life.

The proximity of environment and transparency in technical elements to create more relationship between the inside and outside, the proximity of communication spaces with the activity and pause ones in order to remove limits, the proximity to technical elements in construction in order to create an integrated set, the proximity of form and function and effort towards unity among them in a work, the proximity to intellectual principles and modern philosophical in the design process, the proximity to modern social lifestyle.

In the end, it should be clear that structural and semantic relationships between the given analytical types could pave the way to other multiple interpretations in the field of semiotic architecture and add other conceptual texts in the field of interpretation of architectural representation.

CONCLUSION

Architecture, as a medium producing of form and meaning, always deals with physical limitations such as size, scale, costs and building codes, and also ideological constraints that can be derived from the sociological or even symbol; logical fields. These limitations make the meaning of architecture transcend the realm of purely practical construction and cause the architecture to propose a solution to these type of problems. This problems eventually causes creative abilities for architects to reach a solution. This means different types of items should be taken into consideration in architecture such as physical values of forms, sizes, scales, materiality as well as the poetic symbolism of nature, signs and meaning. Physical and material quality of a building, structures, materials, spatial organization, services, details as well as the procedure of combining them with each other and their building skills process, all refer to a metaphysical presence that represents the building as a thing or a sign. Later, based on the results of the analysis obtained from the above tables, we can eventually classify the constructed concepts of architectural representation in every method as Fig. 31.

The model in Fig. 31 prepare us for the formation of recognizing fields in architectural representation and its formation so far, so through this type of triple analysis, we can become closer to the number of representation effects in the formation of architectural reality.
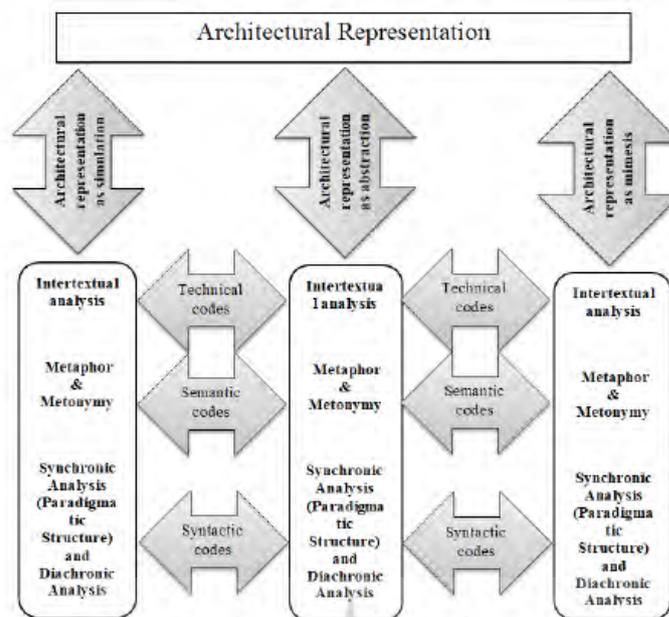
Fig. 31: Analytical, a semiotic model of architectural representation methods, based on Eco's theory of architectural codes.

ENDNOTES

1. Tectonics, in Greek τεκτονικός, is processed in construction which is based on a physical basis.

2. Abstraction, Here abstraction is considered to be as a process representation with the aim of creating a strip in the style of architecture and far from the definitions of the modern movement and focuses on the functional replacement instead of tradition.

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