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## Architecture as Extensive Mind

Ali Marjoui<sup>1</sup>, Bahram Shahedi<sup>2</sup>, Marzieh Piravi Vanak<sup>\*3</sup>, Mariam Ghasemi Sichani<sup>4</sup>

1. Department of Architecture, Islamic Azad University, Isfahan (Khorasgan) Branch, Isfahan, Iran.
2. Department of Architecture, Islamic Azad University, Isfahan (Khorasgan) Branch, Isfahan, Iran.
3. Department of Philosophy, Art University of Isfahan. Isfahan, Iran.
4. Department of Architecture, Islamic Azad University, Isfahan (Khorasgan) Branch, Isfahan, Iran.

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### Abstract

The relationship between man and architecture is usually assessed using behavioral science. However, this research intended to study architecture as a cognitive component using 4E cognition. This is different from the effect of environment on cognition which is often theorized as externalism within frameworks such as environmental psychology. This approach introduces architecture as an essential part of the mind and cognition. The main research question was: how does architecture act as the causative component of cognition? The main purpose of this study was to provide a new understanding of the nature of architecture and consequently, a new discourse to be established with architecture, particularly in the case of interactive and adaptive architectures which practically act as an extension of the body (prosthesis). At the strategic level, the research method was logical argumentation which, at the level of measures, based the analysis of architecture, as the extensive mind, on Merleau-Ponty's phenomenology of embodiment, as the external logic of the argument. This study answered the research question by proving the essential role of metaphor in embodied cognition and consciousness and then, the role of architecture in generating primary and mixed metaphors. Therefore, here, metaphor is not considered a literary device but the foundation of abstract concepts and is strongly dependent on the characteristics of the body of the agent and the function of the body within the environment. The results of this study showed that architecture, as a body, acts as part of the extended mind or as an Exogram and architecture, as space, is the creator, weight-giver, and changer of primary metaphors by means of our sensory-motor behaviors and thus acts as an extensive and integrated mind.

**Keywords:** *Extended mind, Extensive mind, Exogram, Cognitive integration, Metaphor.*

### Introduction

Theories of architecture, influenced by the dominant

methodologies<sup>1</sup>, are usually presented in a way that architecture is studied and identified solely as an object of knowledge. Such understanding explains

\*. Corresponding author: mpiravivanak@gmail.com .  
09133176725

the relationship between mankind and architecture, performance, within the field of behavioral science and in the form of words such as the sense of the environment and perception of the environment. With a different approach, this article intends to introduce architecture, based on the new theories in the field of cognitive science, first as the means of storing information outside of the brain (extended mind) and then, radically, as part of the mind (extensive mind). The extensive mind means the mind is not limited solely to its biological form and to the brain. Rather, the mind, from the very beginning, and by its very nature, was extensive and in addition to the brain, it embodies both the body and the environment the body lives in, and therefore, the mind is a combination of biological and non-biological components. Thus, architecture, as part of the environment, acts also as the non-biological part of the extensive mind.

### Review of Literature

Since the theory of extensive mind does not have a long history in the field of thought, and since theories of architecture have, so far, been based on Cartesian mind-body separation, there has been no study specifically researching architecture as extensive mind yet. However, in the past, even before the theory of extended mind was proposed in 1998 by Clark and Chalmers, it was common to perceive architecture as a phenomenon representing the thoughts of the designer's mind. Given this youngness, the closest research to this study falls in the more general field of environment and humans. All the research done in the field of the relationship between architecture, location, aesthetics, and neuroscience (Pallasmaa, Mallgrave & Arbib, 2013) (Starr, 2013), phenomenology of architecture (Holl, Perez-Gomez & Pallasmaa, 2006); (Pallasmaa, 2009) (Sirowy, 2010), and environmental psychology (Shahcheraghi & Bandarabad, 2015) (Bechtel & Churchman, 2002), they all, by accepting the position of mind in the brain or eventually the embodied mind, assume programming architecture as the factor that can alter some of our behaviors and thus, hold up

the basics of dualism.

### Research Questions, Premises, Objectives, and Hypotheses

This study tried to answer this fundamental question: Does architecture act as part of the extensive mind within the framework of cognitive integration? And if yes, the second question would be: How does architecture act as the causative component of cognition?

With the premise of the uniqueness of the cognitive agent, the horizon of understanding, and being (what has emerged), and using 4E cognitive approach, and in particular, its extended cognition branch, this study offers a new understanding of architecture as the cognitive component, based on which, higher levels of thought are achieved solely influenced by the spatial nature of consciousness and with the help of the man-made environment. This is different from impressionability and is considered the condition of existence. That is, not only is architecture the medium of thought transfer, but it's also the instrument and the possibility of generating thought. Theoretically, this implies a new understanding of what architecture is and consequently, a new discourse with architecture as well as a mutated relationship between mankind and the man-made environment and accepting architecture as a prosthesis by humans who, as dictated by their cybernetic nature, have now become a cyborg with the architectural space. One of the practical uses of architecture as a cognitive component is the role of architecture as the agent of phenomenological epoché, for which, no practical solution has been found despite many claims in the field of phenomenology. The same applies to the generation of the ontological and epistemological foundations of sustainable, flexible and interactive architectures.

There are different ways of assessing and proving architecture as the extensive mind (e.g. measuring the proportion of architecture to techne and technology or its proportion of language). However, this study evaluated and proved architecture as the

extensive mind by proving the metaphorical nature of cognition, thought and consciousness and the role of architecture in generating primary and mixed metaphors (research hypothesis). Peter Woelert believed that spatial existence of mankind (existing in three dimensions) necessarily creates a framework of cognitive integration which is essential for the intellectual capability of mankind and its development at higher levels. The structure and function of this spatial cognitive framework intrinsically depend on the spatial structure and dynamics of the body in space (Woelert, 2011). Today, such studies are characterized, in addition to argumentation and inherent logic, by their reliance on some empirical evidence from neurology. For instance, recent studies on the hippocampus, with emphasis on the flexible nature of the brain, have proven the relationship between the situational mapping capability of the brain and abstract thinking, especially when determining the relationship between phenomena (Goodbun, 2011; Grives & Jeffry, 2017). Therefore, the situational position, as shown in Fig. 1, is not a representation of an abstract thought on the outside but the condition for the appearance of an abstract thought, via externalization, and the extension of the mind in the form of environmental material (non-physiological) properties. Using the parts related to vision in the brain (the optic structures in the nervous system), this process creates a new capacity for the creation of body-oriented primary metaphors which



Fig. 1. Embodied order, the condition for the appearance of primary spatial metaphors. Source: highland-stonecraft.co.uk.

wouldn't be possible without the presence of these components.

## Theoretical Framework

### • Basic Cognitive Approach

The basic cognitive approach in this research was 4E which itself consisted of four independent branches in the field of cognition. The main theoretical ground and the first component of 4E cognition, i.e. Embedded Cognition, is rooted in the concept of 'being in the world'. According to Hubert Dreyfus, what made it possible to methodologically shift from epistemological questions to ontological questions in the tradition of philosophy was the proposition of this concept and following that, the concept of Dasein or 'being there' (by Heidegger) (Dreyfus, 1990: 1), because in this state, cognition becomes a form of the possibility of 'being in the world' meaning cognition can no longer be an absolute or transcendental phenomenon for gaining access to the essence.

The second branch is Embodied Cognition which is the main component of cognition in modern approaches and is mostly owing to the phenomenological theories of Maurice Merleau-Ponty. In this approach, cognition is deeply dependent on the physical body of the agent and in cognitive processing, the role of the body surpasses the role of the brain (Wilson & Fogila, 2017). Lawrence Shapiro believes that three properties separate embodied cognition from the traditional cognitive science: First, the idea that the understanding of an agent of his/her world is fundamentally dependent on the nature of the agent's body and thus, a different body would mean different cognition. Second, the interactions of the agent with the world replace the need for mental representation and thus, cognition is not an algorithmic representation based on symbols. And third, the world of the agent and his/her body constitute the mind and therefore, the body is the constituent of cognition and does not merely play the role of a medium between the world and the mind.

The third branch is Enactive Cognition and was

proposed for the first time by Varela, Thompson, and Rosch in 1991 in their book *The Embodied Mind* (Varela, Thompson & Rosch, 1993). “Enactivism is inspired by the insight that the embedded and embodied activity of living beings provides the right model for understanding minds” (Hutto & Myin, 2013: 4). The concept proposed by Varela et al. states that the experienced universe is a portrayed image, not an acquired or discovered one (Wilson & Fogila, 2017). And this image is the product of a dynamic interaction between sensory-motor properties of an organism and its environment (Thompson, 2010). So the world is not an existing and objective phenomenon, but is an emergent phenomenon instead and as a result human being converts from a cognitive agent to one of the components of cognition situation.

The fourth branch is called Extended Cognition which will be discussed at length in the next section.

### **Extended Cognition**

The concept of extended mind, as the basis of extended cognition, means that the mind of the agent and its related cognitive activities are not limited to the skull or even the body. Rather, they are spread within the world of the agent (Wilson & Foglia, 2017). In the past, thinkers like Putnam and Burge talked about externalism in the field of cognition. But what Clark and Chalmers proposed is a kind of active externalism and thus, is different from the previous concept. Here, the conventional interpretation of externalism, i.e. the influence of the environment on cognitive processes, is not intended. Rather, this discussion is about those cognitive processes which can only be realized through the active use of external factors (Menary, 2010a: 2).

The proponents of this theory believe that it's not necessary for all components of a cognitive system to be accumulated in the brain and that part of the information can be stored or used, as appropriate, outside the brain and thus, cognition spreads not only to the whole body but also to the universe. Now, the question is: when do the information and the external

tools are considered a part of the brain? “When parts of the environment are coupled to the brain in the right way, they become parts of the mind” (Clark, 2008: X). This points to a cognitive system enacted from internally and externally linked factors which cannot exist beyond this link. According to what Clark and Chalmers state in their article on the extended mind, in this state, the human organism connects with external symbols reciprocally and therefore, this correlated system acts as a whole cognitive system (Thompson, 2010: 29).

In the book *Supersizing the Mind*, Clark makes some examples confirming that the boundaries between the mind and the world are much more flexible than we imagine. His most important example is Otto's notebook, an Alzheimer's patient. The example explains how the notebook of a person suffering from Alzheimer functions the same as an ordinary person's mind and plays a causative role in navigation. Besides Clark and Chalmers, there are other thinkers who believe in the existence of the basics of consciousness outside the head (Noe, 2004; Wilson, 2001; 2004; Sutton, 2005; 2010; Rowlands, 2009).

Why these correlated external and internal factors act as a system was explained by Richard Menary as follows: 1) all the components in these systems play a causative (not auxiliary) role; 2) the external components affect the behavior just as the internal factors of cognition affect behavior; 3) if we remove the external components, the capabilities of the behavioral system are eliminated, as if part of the brain is removed. Therefore, this is equivalent to a cognitive process, which all its components are not just in the head (Menary, 2010a: 3).

There are two different views on the subject of extended mind: first is the asymmetric effect. That is, in the example of the notebook, the removal of the notebook would not mean that part of the mind would be missing. The other is the symmetric effect. That is, the internal and external properties have a reciprocal causal effect on each other that has arisen over time. Menary calls this cognitive integration which he

discusses in his article, *Cognitive Integration and Extended Mind* (Menary, 2007; 2010a: 227-244). Critics of extended mind theory believe the effect of the environment to be symmetric although it appears that what Clark and Chalmers intended was an asymmetric effect. Michael Wheeler believes that this misunderstanding arises from the assumption that all the external factors must have a benchmark in the brain to be able to act while the external factors can also act without a benchmark (Wheeler, 2010: 245-270). For instance, using pen and paper to solve a math problem or the order of writing numbers under one another to multiply as well as the ability to edit a text which is only possible in writing show that some external factors play the causative role in cognition without being information. This means that the brain, to control the external environment and increase the possibility of life, also uses the external cognitive capacities and the external components of cognition play an enactive role. That contrasts with those views that attribute only an auxiliary role to the external components. This point of view can create new capacities for receiving and using works of art and architecture which will be discussed in the next section. In fact, every tool and environment inherently has cognitive content.

The first empirical signs regarding the extension of the mind are related to mirror neurons. Mirror neurons reflect the actions of another person in our brain. As if we ourselves are doing them. As if we are the mirror and not the processor and the observer. And in fact, this is the process of unconscious thought transfer (Lacoboni, 2009). In the importance of mirror neurons, Vilayanur Ramachandran, a neurologist, said: "mirror neurons will do for psychology what DNA did for biology" (Corballis, 2010) because the presence of mirror neurons means that our brains are connected to each other (are spread to outside). Therefore, the extension of the mind depends on our life and particularly, on our collective and social life. The underlying foundation of social life, i.e. culture, is itself a symbol of the extended mind. Aside from the transcendental definitions of culture, in its

underlying roots and constituent units, culture is a collection of meaningful signs shared by the members of a society. These signs can be motive, vocal, or written. So, what makes culture possible is language in all its forms. The most important thing language accomplishes is establishing a connection between separate brains. It's not an accident that through the formation of language and the communication of brains, human knowledge and mankind's power of instrumentation grow exponentially. John Hoffecker calls this event the super brain and the collective mind which was formed 75000 years ago in Africa (Hoffecker, 2017).

Distinction between man and what extends him, although physiologically or non-physiologically possible, is not so simple in semantic and cognitive terms. For instance, this difficulty is evident in soft technologies, that is, specialized languages and particularly mathematics. Unlike Galileo, who believed that the book of existence was written in the language of mathematics, we know that math is an arbitrary language that humans have established and its most basic foundation is creating a one-to-one correspondence between an external entity and a symbol or sign. One of the hidden functions of math, i.e. abstraction, is determined in a one-to-one correspondence. However, establishing the concept of abstraction in human mind has itself become a new intellectual basis. Symbolic thinking or the intellectual power of mankind in using something as the symbol of something else represents a huge step in human evolution. Yet, we know this process of symbolism was also not easily gone through and many nations considered one, two and many as the basis of counting, or that zero appeared much later than other numbers (Yong, 1996). It's clear why that is. Establishing correspondence between nothing and a sign, which necessarily existed and was represented, was difficult. So, as Gregory J. Shepherd states, communication requires language and technology which are both a form of techne (Sterne, 2006: 91). Language and technology are both factors of human extension. Language provides

the extension of, and communication between our brains and technology makes it possible to extend and increase organ abilities and perceptual power (Mitcham, 1994: 21-42). When cognition becomes embodied, it necessarily can become extended too, because the characteristics of the body can be extended in the form of technology (Wilson & Clark, 2009: 56). This state of being extended is enacted cognition, meaning, the world is not already present and waiting for our cognition. Rather, since birth, through sensory-motor experiences, every child is enacting a world which is essentially an extensive mind.

Such a view, in combination with enactivism, introduces a new concept which Hutto and Myin address in their book, *Radicalizing Enactivism*, as “from extended to extensive mind” (Hutto & Myin, 2013:135-154). In this point of view, it’s not the mind that spreads outside the skull but the cognition which is extended or extensive in its nature. It means that the complementary internal and external structures, together, play a single role in the mechanism of cognition and cannot be removed or value-ranked. Therefore, the mind has always been an extensive phenomenon and it’s the distribution of duties and the type of information storage that separates them into external and internal in our eyes. Michael Wheeler also maintains that accepting extended functionalism would necessarily mean accepting enacted cognition (Wheeler, 2010: 245-270). Overall, accepting cognitive integration would mean that the mind is not only an extended phenomenon but it, in fact, is also an extensive phenomenon, meaning without enacted links with the world, it would be unable to enact the outside world. Enacted link requires a significant capability called manipulation of external structures (which will be referred to in the next section as array). This manipulation and restructuring is sometimes for the purpose of accordance with the affordances of the organism, for convenience, speed or higher possibility and sometimes for the purpose of contrasting it and creating and expanding new capabilities. This is where architecture can

play the role of an effective external component in cognition. Menary puts this in these terms: cognition is the coordinated bodily processes of the organism with significant environmental aspects which often are created or maintained by the organism. This coordination is the condition for the occurrence of cognitive actions (Menary, 2010c).

## Research Methodology

The research methodology of this research, at the strategic level, is logical argumentation (Groat & Wang, 2013: 379-414). Logical argumentation depends on logical reasoning, at the level of measure, to achieve logical argumentation from being and phenomena. Here, the philosophical structure of phenomenology has been chosen as the logic of reasoning. Since there are different interpretations of phenomenology and given the subject of this study, Merleau-Ponty’s phenomenology (Piravi Vanak, 2010) was chosen as the basis. This reason for this choice was that the main concern of Merleau-Ponty, i.e. “phenomenology of perception” (Merleau-Ponty, 2002), was also the subject of this study. Besides, his phenomenology is based on the embodiment of the mind (Spiegelberg, 2013: 792-853) which is one of the pillars of 4E cognitive approach. In fact, embodiment (one of the branches of 4E cognition) is where phenomenology and 4E cognition meet and their shared topic is also perception and how the world is understood and realized. The system established here through model innovation provides us with a fundamental argument which will lead to a number of logical findings regarding the nature of architecture and its relationship with mankind and the environment. This system, following an internal coherence in the field of architecture, is based on external logic [of 4E cognitive approach].

## Findings

Architecture as extended mind: The extended mind is the prelude to the acceptance of extensive mind. As mentioned, based on the theory of extended mind, there is the possibility that some of the information

is stored outside the mind. Such phenomena, most of which Merlin Donald calls exogram (Donald, 1991: 269-360) have different capabilities and features than internal memory and these features make them an effective factor in the generation of the modern mind. Donald proposes three stages of cultural transition to reach the mind in its modern form: first is mimetic culture, the second is mythic culture and the third is the theoretic culture which is based on external symbolic storage of information. Works of art and even language can be categorized as external symbols or exograms. In general, whatever can naturally or as a result of human activity take the form of a specific array outside the mind acts as a source of information and consequently, storage of information. In addition to the role they play in the storage and maintenance, stabilizing (embodying) the exograms on the outside allows for the sharing of information. And this sharing has one result: reading. This creates a very important possibility regarding the mental-visual knowledge which arises from the dynamic nature of exograms. The paradox that results, that is, the embodiment of information, on one hand, and the dynamic nature, on the other, is not a strange phenomenon and depends on the phenomenon of reading and hermeneutics, the discussion of which is beyond the topic of this article. However, today, it is known as one of the existential

structures of man and human knowledge. Overall, we can claim that “our skilled use of such crafted aids changes both the locus of memory in general and the role of our biological memory within the new larger systems” (Sutton, 2010: 189).

Since architecture is an array of volumes, objects, lights, shadows, sounds, spaces, views, colors, textures, patterns and whatever else that takes form and order through architecture, then it acts as an exogram (Fig. 2). In an article titled *Exograms and Interdisciplinarity: History, the Extended Mind, and the Civilizing Process*, John Sutton states that the theatre stage is not just for play but it’s a cognitive map for the progression of the play (Menary, 2010a: 202). And this can be generalized to architectural space and any creation of mankind and similarly, he considers the civilizing process as the process of ordering and arraying our minds and behaviors which is necessarily realized through external arrays and sharing of the information (exograms). Cognitive archaeology is the reverse path that John Onians travels in the field of architecture and examines architecture as the tool for analyzing the brains of the people of past civilizations. For example, he uses this method in the article *Greek Temple and Greek Brain, Body and Building* (Onians, 2002: 44-63) and concludes that compared to the ancient Greeks, we have a different configuration in our nervous system because we live



Fig. 2. Architecture is an array of all that emerges only with the help of architecture. Left: Library of Birmingham by Mecanoo (dezeen.com), an artificial array which is an instance of what Schulz said: Every meaning necessarily emerges in a specific location and this emergence determines the character of that location. Right: Lut Desert, a natural array. Photo: Marjouei, 2017.

in a different environment than the Greeks.

Architecture as extensive mind: Before we explain the role of the body and then architecture in the generation of metaphors, it is necessary to elaborate on a more fundamental matter, that is, the metaphorical nature of cognition. What challenges the new findings in cognitive science, the previous basics in the field of cognition, especially in Western philosophy can be summarized in three parts: 1) The mind is inherently embodied; 2) Thought is mostly unconscious; 3) and Abstract concepts are largely metaphorical (Lakoff & Johnson, 1999: 3). "Thought is embodied, that is, the structures used to put together our conceptual systems grow out of bodily experience and make sense in terms of it; moreover, the core of our conceptual systems is directly grounded in perception, body movement, and experience of a physical and social character" (Lakoff, 1990: XIV). However, by accepting that thought is creative and imaginary, Lakoff points out that creativity is also physical, albeit indirectly because metaphors, ironies and mental imagery are themselves based on experience, often physical (Lakoff, 1990: 15). In addition, Lakoff believes thought to have Gestalt (non-atomic) properties which means several multifaceted factors affect thought, be it at the neural, physical or environmental level. All these properties somehow cause the mediation of space including designed (architectural) space because the physical nature of the mind inevitably makes thought dependent on human sensory-motor abilities (Noe, 2004; O'Regan & Noe, 2015) and these abilities are manifested in a location and dependent on that location and its arrays.

The following is listed to prove this. Johnson's (Lakoff & Johnson, 1999) theory of mixing states that in mental judgements and experiences, children are so mixed with the sensory-motor experiences that they cannot be distinguished, but this initial mixing, for instance, allows the child to be able to use phrases like warm smile or intimate friendship through these sensory-motor experiences such as being in the arms of the mother or the warmth generated by it.

Therefore, in the course of our daily activities, we are unconsciously building and learning primary metaphors and due to neural connections, which are formed during the mixing period, and using primary metaphors, later, we necessarily, naturally and fundamentally think in terms of metaphor. For instance, mental judgment about a quantity depends on the sensory-motor experience of our body in space. It's also affected by the direction of the body in space. So, quantities are, first and foremost, defined along the vertical direction, i.e. up and down (not e.g. left or right) and second, in this vertical direction, corresponding to the difficulty of the body in overcoming gravity, up is conceptualized as more and down as less. That's why when we say "The prices have gone up" it makes sense to us and is not counted as abstract despite its metaphorical nature. Another possibility regarding the generation of metaphorical concepts which are directly dependent on the space and the position and relation of the body to it arises from the metaphorical nature of architecture and location and building in its entirety (our mental image of a place). That's why Barie Fez-Barrington introduces aesthetics as the commonplace for metaphors (Fez-Barrington, 2012:100). It's possible to prove this by example of some seemingly abstract words. For instance, different architecture and consequently different spaces allow a single exogram to be able to have different manifestations in different places. Since this allows for different understandings of a phenomenon, it can enact one of the most important metaphors in the field of epistemology, that is, situated cognition, which is considered in some sources as an equivalent for 4E theory as the basic theory of this study (Robbins, 2009; menary, 2010b). The name 'structuralism' is also a metaphor adapted from the field of architecture. *Structura* is a Latin root meaning framework of a building which determines the internal relations of the components (Ahmadi, 2016: 37). As another example, in finding the etymological roots of the word 'truth', Heidegger associated it with the Greek word *Aletheia* which means 'unconcealedness'

and is associated with a positional situation in the forest where due to the thinning of the trees, the light shines through and so, whatever can be seen in this bright spot also enjoys clarity (truth) (Heidegger, 2005). The dependence of the concepts of darkness and brightness and the scale of the open position in the middle of the forest relative to the physical characteristics of human body and human senses, and the position of the human body relative to this defined natural space point towards the metaphorical roots of the abstract concept of truth.

Another example of this is the word 'theory'. This word is derived from the words *Thea* and *Horan* which together mean choosing a scenery to look at (Ansari, 2010). The fact that a scenery depends on the body and perception and the position of the body in the environment and that architecture, as a human action, provides different sceneries point towards the metaphorical-locational association of the word 'theory'.

Primary neural metaphors also play a role here. For instance, fear of the dark and ambiguous and the metaphorical relationship between *Aletheia* and truth and the value of the truth (unconcealedness). Or the word 'theory', which is based on the natural metaphor of field of vision, is itself a product of the primary metaphor of container. In their book, *Metaphors We Live by*, Lakoff and Johnson explain that the skin defines the boundaries between us and the environment and that leads us to experience the environment outside our own existence. This creates the primary metaphor of container which at the

same time, defines a direction to outside or inside in relation to the body. Similarly, we imagine rooms as containers and thus, concepts such as threshold become meaningful. This container metaphor is generalized and we even consider spaces that have no clear boundary, like a forest, to have a boundary and thus having inside and outside. "Given that a bounded physical space is a CONTAINER and that our field of vision correlates with that bounded physical space, the metaphorical concept VISUAL FIELDS ARE CONTAINERS emerges naturally" (Lakoff & Johnson, 2003: 30) and things enter or exit our field of vision.

The container schema (Fig. 3) is one of the most fundamental schemas with which we conceptualize many of our activities. We constantly feel our bodies as containers and as stuff being in the container (Lakoff, 1990). The container metaphor is metaphorical externalism which contains the concepts of boundary, inside and outside within its topological structure (Malafouris, 2013) and thus direction (outward or inward), as well as distance (being far from or near the boundary or center), is also conceptualized. Architecture, as the third skin (the first skin being the biological skin and the second skin being our clothes), gains this particular ability (i.e. distinction between inside and outside) primarily by accepting the container metaphor and secondly by limiting the building of vision and sound within its boundaries which are both directly related to our sensory-motor abilities.



Fig. 3. Peruvian jars from the Pitt Rivers Collection representing the fundamental metaphor of container, influenced by the human body as container and the evolving to more functional forms over time. Source: Steadman, 2008: 107.

## Discussion

If it's proven that architecture plays an essential role in the production of at least some of the metaphors, the hypothesis of this study is proven. And then, architecture would take a causative role both as an extended mind and as an extensive mind. The premise of this claim is accepting the 4E cognitive approach which turns mind from a phenomenon limited by the brain to an embodied and extended phenomenon which is enacting itself and the environment where other previous boundaries are no more valid and live in unity, a unity that is considered the condition for the existence of all three (the brain, the body, the environment). Throughout history, architecture has had the opportunity to establish new metaphors by manipulating the relations between spaces, like integration (ancient Greece) or consisting of interactive spatial elements (baroque) or by placing the building in a natural scenery (enlightenment era) or in an entirety where the components are inseparable (Gothic settlements).

Julian Jaynes conceives of building space as one of the

fundamental components of consciousness. He calls the paraphrand of any mental metaphor which we are able to build mind-space (Jaynes, 2000: 56). "These words are all metaphors" (e.g. we see solutions to problems) "and the mind-space to which they apply is a metaphor of actual space. In it, we can 'approach' a problem, perhaps from some 'viewpoint'" (Jaynes, 2000: 55). The 'viewpoint' mentioned in the previous sentence can be like the 'theory' metaphor which was explained before. Jaynes believes that "things that in the physical-behavioral world do not have a spatial quality are made to have such in consciousness... Time is an obvious example... spatialization<sup>2</sup> is characteristic of all conscious thought" (Ibid: 60). And architecture is the tool for designed (conscious) spatialization. Even time can be understood through the metaphor of space. Time is not a phenomenon that can be understood directly and in a non-metaphorical process (Sojoudi, 2012); (Boroditsky, 2000).

To clarify the relationship between sensory-motor experiences which have led to the abstract mental concepts, some of them which were mentioned in

Table 1. The relationship between mental judgments and the associated area of architecture<sup>3</sup>. Source: authors.

Mental judgment	Sensory-motor area	Primary experience	Associated area of architecture
<b>Happiness</b>	Body orientation	Correspondence of the emotional state and the situation of the body	rank in the spatial order
<b>Intimacy</b>	Locational closeness	The physical closeness to intimate people	
<b>Quantity</b>	Vertical orientation	Observation and experience of levels going up and down	
<b>Privacy</b>	Enclosure	Living in close quarters with friends and family	
<b>Sensory perception of types</b>	Space	Correlation between the common location and common features	order and effect in the causative structure
<b>Resemblance</b>	Proximity in space	The feeling of a correlated state with a certain location	
<b>State of mind</b>	Being in an area	The feeling of change in state simultaneous with the change in location	
<b>The feeling of change in state</b>	Relocation	Correlation of action and movement in space especially during childhood	
<b>Action</b>	relocation of the body in space	Movement, the basis of reaching a phenomenon	
<b>Reaching the goal</b>	Reaching the destination	Correlation between motion and advancement in space	Order in the assessment of time
<b>Amount</b>	Movement	The feeling of passage of time resulting from the movement of the person or observation of movement	
<b>Passage of time</b>		Correlation between observation of the structure of whole and part	Order in spatial classification
<b>Unifying relationships</b>	Experiencing physical objects		

the book *Philosophy in the Flesh* (Lakoff & Johnson, 1999) and are essentially dependent on the position of the body or motion of the body in space are shown in Table 1 with their associated area of architecture. The important point is that “contrary to long-standing opinion about metaphor, primary metaphor is not the result of a conscious multi-stage process of interpretation. Rather it is a matter of immediate conceptual mapping via neural connections” (Lakoff & Johnson, 1999: 57). Therefore, the spaces designed

through repetition of our behavior in space or through innovation in our behavior can unconsciously create primary metaphors or give them weight or even change them (Fig. 4, 5, 6, 7). Moreover, by accepting architecture as the third skin (Hendershott, 2013: 52) and as an extension of the body, everybody-oriented metaphor, affected by this extension, can change. It should be noted that the third skin and even the general idea of this discussion can be outlined and understood in a metaphorical system.



Fig. 4. Perception of time becomes possible for humans through metaphor. Different capabilities in the relationship between motion and advancement in location and metaphORIZATION. Left: Arnheim Central Transfer Terminal by UNStudio (architectmagazine.com); and right: Phillips Exeter Academy Library by Louis Kahn. Source: Wiggins, 1997: 20.



Fig. 5. Architecture provides different concepts of enclosure. Left: Klein Bottle House by McBride Charles Ryan (dezeen.com) which was designed based on the characteristics of Klein Bottle and negates the concepts of inside and outside; and right: Salk Institute by Louis Kahn using the common concept of enclosure. Source: www.archdaily.com.



Fig. 6. Some human behaviors manifest in places with special characteristics. Left: engraving of Ball masque dance in Court Theatre in Bonn, Germany, during Baroque period (Soergel, 2005: 77); and right: MAXXI Museum by Zaha Hadid (dexigner.com), an environment for post-human behaviors. Source: www.dexigner.com.



Fig. 7. one of the most important capabilities of architecture is the generation of component unifying metaphors. Left: Santa Maria Novella by Leon Battista Alberti (wikipedia.org) designed based on the relationship of whole and part; and right: Guggenheim Museum Bilbao by Frank Gehry (archdaily.com) and challenging the traditional concept of composition. Source: www. archdaily.com.

## Conclusion

Since cognition is essentially metaphorical and that many of the metaphors are rooted in the type of sensory-motor connection of our bodies, architecture, as the enactor of space, enacts primary and secondary metaphors in its different forms. And this implies a causative role for architecture in cognition which in turn, given the research question and hypothesis, means that architecture acts as an extensive mind.

On the other hand, the main feature of consciousness, as the product of mind and cognition, is spatialization. This mental process is fully influenced by the characteristics and patterns of the natural and human-made spaces.

Therefore, according to the following figure architecture also plays a causative role in consciousness.

The transdisciplinary finding of this research claims that: cognition, in humans, is extension and making something part of oneself. Extension is done through techne and the universe is the limit of extension for any human (or other being). In this state, extended cognition and enacted cognition become two sides of a coin which equates with extensive mind or cognitive integration. In other words, accepting cognitive integration, perforce, would mean accepting architecture as extensive mind.

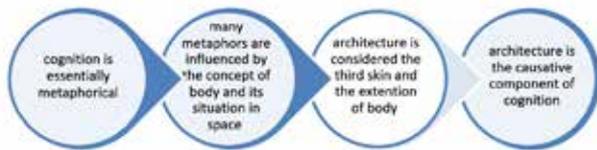


Fig. 8.. The process of architecture as the causative component of cognition. Source: authors.

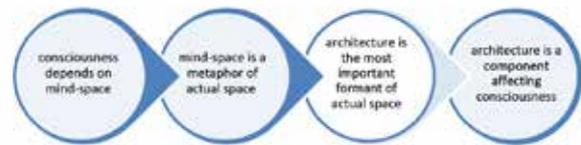


Fig. 9. The process of architecture as the component affecting consciousness. Source: authors.

## Endnotes

1. In this research, by methodology, we mean the ontological and epistemological area of the research. / 2- In addition to spatialization, Jaynes also assigns other properties to consciousness: exception, the analogue I, the metaphor me, narratization and conciliation. / 3- The last column (the associated area of architecture) is by the author and the rest were adopted from Lakoff and Johnson's studies.

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