
Designing “pre-reflective” architecture

Implications of neurophenomenology for architectural design and thinking

Concevoir une architecture « pré-réflexive » - Implications de la neurophénoménologie pour la conception et la pensée architecturales

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**Electronic version**

URL: <http://ambiances.revues.org/628>

ISSN: 2266-839X

Publisher:

Direction Générale des Patrimoines - DAPA
- MCC, UMR 1563 - Ambiances
Architectures Urbanités (AAU)

Electronic reference

Andrea Jelić, « Designing “pre-reflective” architecture », *Ambiances* [Online], 2015 | Experiential Simulation, Online since 11 September 2015, connection on 07 February 2017. URL : <http://ambiances.revues.org/628>

This text was automatically generated on 7 February 2017.



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Neurophenomenology and architecture: opening a dialogue?

- ¹ In architectural circles, the recent “sensorial revolution”, the rediscovery of multi-sensoriality, has found expression in renewed interest in rethinking the experiential dimension of architecture. This shift toward appreciating more than just the visual properties and (visual) aesthetic appearance of architecture is mirrored in the revival of architectural phenomenology and marked by the first publication of “*Questions of perception: phenomenology of architecture*” by Steven Holl, Juhani Pallasmaa, and Alberto Pérez-Gómez in 1994. Over the last two decades, this has resulted in an ever-increasing number of inquiries regarding the notion of atmosphere and the sensuous qualities of architectural and urban spaces. Common to all these efforts is the emphasis on human experience as a central concern in architectural design, as well as the understanding that such repositioning requires us to adopt a new stance toward the phenomenon of the architectural subject. The insights from cognitive sciences have thus recently entered architectural discourse through the attempt to understand the experiencing architectural subject and discover the hidden or less known relations existing between body and built environment. In particular, neurophenomenology as a unique mode of studying experience has presented itself as a strong incentive for rethinking fundamental issues in contemporary architecture and demonstrating the unsuitability of the currently

used dualistic, disembodied human model against the more authentic, neurophenomenologically-based model of a human being as an architectural subject.

- 2 The initial appearance of neurophenomenological discourse is closely related to the recognition of the relevance of experience in addressing matters in cognitive sciences and the subsequent profound changes inside the field itself. In a nutshell, persistent objection to the strong Cartesian mind-body dualism has been matched by progress in embodied approaches to cognition, with phenomenology being recognized as a prospective method for studying the experiential dimension in rigorous scientific terms¹ (Thompson, 2004; Gallagher, Zahavi, 2008). One of the results of these endeavours is a specific research approach of neurophenomenology² - essentially, it focuses on analyzing the structure of experience as the accurate description-base of our embodied existence by intertwining the phenomenological accounts with their neurobiological and cognitive counterparts. The outcome of such an inquiry is a growing awareness of the embodied nature of our overall consciousness and being in the world; as an existential and social art architecture cannot remain immune to these new insights. Accordingly, any attempt to capture the richness and structure of architectural experience should draw on this newly established, complex evidence-base, describing the nature of our embodied minds and lived, phenomenal bodies. In comparison, the situation in contemporary architecture is quite paradoxical: even though it is accepted as evident that every architectural experience is always a multi-sensory event, there is a strong tendency to exchange it for intellectualized experience of space, which resides in our ocular-centric conception of the world, in architecture, and most of the commonly used design tools, all achieved on the basis of an instrumentalized and physical-mathematical representation of spatiality. As Vesely argued, the mind-body dualism can be traced back as a source of contemporary architecture of self-reference and disembodied subject, seriously compromising architecture’s quintessential task of being a highly-sensitive framework for a meaningful human life (Vesely, 2004).
- 3 The crucial discoveries of mirror neurons and the related mechanism of embodied simulation, a better understanding of sensory perception and emotions, the importance of the hedonic brain circuit and proprioception for (aesthetic) experience³, to mention but a few, clearly imply that all our engagements with architecture are primarily structured by our more basic corporeal responses (Mallgrave, 2013). Most importantly, these perceptual and bodily responses precede conscious awareness – that is, they precognitively inform our response to things and situations. This is of immense importance for architects since it means that in just a few instants, a pre-reflective judgment of architectural space is delivered by perceptual experience, scarcely replaced or substantially improved by conscious immersion in understanding the space’s structure and meaning. Therefore, the essential idea of “*pre-reflective*” architecture is that there exists a particular precognitive communication between an architectural work and the body, which shapes the overall (embodied) experience of an architectural setting. This inherent connectedness can be understood through neurophenomenological investigations of architectural experience based on the nature of perception and the human body, allowing us to reveal the underlying invariant structure of such an experience – that is, a structure dependent on and determined by our embodied existence. Notably, the opening of such architectural dialogue with neurophenomenology would enable design thinking to refocus on the phenomenal body as an architectural subject and thus, support growing awareness of the fact that the primary area of

architectural intervention belongs to a realm of experienced space, “the space as it is manifested in concrete human life” (Bollnow, 1963, 2011, p. 19).

- 4 The importance of pre-reflective architecture-body communication is particularly sustained by the phenomenon of neural plasticity or “the ability of the brain to alter its neural connections in response to environmental conditions” (Mallgrave, 2013, p. 12), implying that architectural structures and design affect the brain, and consequently, peoples’ behaviour (Eberhard, 2009). As a matter of fact, neurophenomenological interpretation of the latest interdisciplinary findings unequivocally confirms that the experiencing subject is a profoundly embodied, enactive and situated human being⁴. The enactivist background of neurophenomenology supports the sensorimotor theory of perception which emphasizes the rich and innate interrelation of neural dynamics with the dynamics of the body and world (Beaton, 2013). From a neurophenomenological viewpoint, organisms ‘enact’ or ‘bring forth’ their worlds; enaction enables a world to ‘show up’ for the individual. Thus, our perceived world (the world as perceived) is constituted through complex and delicate patterns of sensorimotor activity (Thompson, 2007). Such an understanding of our interaction with the world puts in its neurophenomenological perspective Mallgrave’s observation, initially based in phenomenological tradition: the environment that we inhabit is both a Husserlian lived-world (*Lebenswelt*), through being the enactive field of our actual and simulated embodied experiences, and a Merleau-Pontian world, since our bodies are being proved to be intentional beings whose consciousness is corporeally defined by our situational responses to (understanding of) the built environment (Mallgrave, 2013). In other words, we engage with architecture through embodied action - it is a building element of our subjective experiences and phenomenal minds on the basis of enabling and supporting the enactive sense-making *i.e.* transforming the world into a place of salience and meaning through interaction⁵. Thus, the connection with architecture is actively sought, and is an inherent component of our human nature and constitutive element of our cognition and consciousness. Interestingly, this resonates very well with Pallasmaa’s suggestion that memorable architectural experiences have a verb form: authentic experiential or mental constituents of architecture are always “*confrontations, encounters and acts which project and articulate specific embodied and existential meanings*” (Pallasmaa, 2011, p. 124, original emphasis). In sum, it can be argued that this pre-reflective architecture-body communication is the ultimate source of meaningful and life-enhancing architectural experiences, rendering the neurophenomenological analysis of this issue ever more necessary.
- 5 What is particularly persuasive about neurophenomenological insights is that their implications in architecture are twofold: first, they offer a profound understanding of perception and architectural experience in its multi-sensorial richness, allowing us to consider anew the many ways every individual relates to his or her architectural surroundings, and essentially, what it is about architecture that has the capacity to sustain and nourish a meaningful human existence. The other issue involved is that the design process in itself is embodied in nature; in other words, many intuitive workings and decision-making processes originate in the architect’s own phenomenal body and embodied mind as the first unit of measure of any emerging architectural space. The act of design is a process of internalizing imagined spaces in the architect’s own body; “movement, balance, distance and scale are felt unconsciously through the body as tension in the muscular system and in the positions of the skeleton and inner organs”

(Holl, Pallasmaa, Pérez-Gómez, 2006, p. 36). Finally, the fundamental potential of these neurophenomenological views from two sides of architecture is the possibility of creating a positive loop between understanding design and understanding concrete architectural experiences. This reciprocal exchange of knowledge is ultimately aimed at creating architectural settings providing experiential richness and satisfactory contexts for human lives.

- 6 Before proceeding, it is worth mentioning the significant advantages of neurophenomenology as a more appropriate approach to architecture compared to “pure” neuroscience. Naturally, when trying to embrace novel insights from neuroscience, architecture has to be cautious with regard to the reductionist trap. On the contrary, neurophenomenology has emerged precisely in opposition to the internalist proposals of reducing complex phenomena to internal, brain-based dynamics. Because of the enactive basis, neurophenomenology supports an externalist account of experience (*i.e.* the sensorimotor view), and therefore, it assumes that our minds and subjective experiences are always shaped through meaningful, agent-world interactions. Put simply, in the neurophenomenological view of human nature, the architectural environment is seen as an indivisible and constitutive element of our mental and physical life. On the other hand, the contribution of phenomenology to neuroscientific investigations, equips the neurophenomenological method with built-in criticality⁶. Lastly, the crucial advantage of a dialogue between architecture and neurophenomenology lies in the compatibility of ideas already present in architectural discourse – its phenomenological legacy – and the same theoretical background of neurophenomenological approach. Therefore, the existing common ground facilitates more accurate definition and overlapping of investigative goals, while the phenomenologically enriched scientific hypotheses allow for the exploration and protection of the intrinsic artistic and poetic spirit of architecture as a discipline.
- 7 The following argument is organized according to the two mentioned lines of inquiry. Firstly, several key concepts are presented to explain the neurophenomenological basis of perception and architectural experience, centring primarily on the human individual as an experiential (architectural) subject. Secondly, we draw attention to the embodied nature of the design process itself and the specificity of the architecturally-trained brains with the range of consequences it imposes on design and way of thinking about architecture.

Embodied architectural experience: a neurophenomenological inquiry

- 8 To understand architecture in neurophenomenological terms, it is necessary to introduce in more detail the previously mentioned, essential neuroscientific and biological concepts regarding brain and body functioning. It can be argued that the total neurophenomenological knowledge-base can provide us with the best currently available approximation of the human being in its biological and cultural complexity, which can be used in architectural design and thinking. To sustain this aim, there is a requirement for an architecturally interpretable definition of what it means to be, to exist embodied. Such explanation directly provides a clearer understanding of how human individuals relate through their bodies to the environment, more precisely the built, architecturally structured world, and concurrently, how such knowledge could be of use in architectural

design. To facilitate the clarity and coherence of the argument, the work will proceed by outlining summarized understandings of three key aspects inseparably related to engagement with architectural spaces, while recalling that these insights are one of the components of extensive and complex research on brain and bodily workings, of which others can also be very valuable to our comprehension of this special body-architecture relationship. The highlighted issues are selected because of their constant presence and more or less (un)conscious employment by architects throughout architectural history. In the light of new neuro-based knowledge, the aim is to account for the cause and effect of possible interactions between body and architectural form, and suggest that specific design intentions can always to a certain degree achieve a specific corporeal reaction, which thus, can be used as a sort of design guidelines where required or expected.

Embodied metaphor and emotion

- 9 As previously mentioned, the main inadequacy of interpreting the world, and in particular, architectural experiences, in terms of mind-body division, is the belief in the necessary reflective immersion in the world for our actions and life to become meaningful. Conversely, because perception is enactive and embodied - inherently connected with the sense of movement, as a core agent of every act of intentionality (achieved through the body) - it is already meaningful and moreover, it can only be further enriched by the circumstances and possibilities of such embodied existence. The reason is to be found in one of the essential postulates of neurophenomenology: cognitive structures and processes emerge from recurrent sensorimotor patterns of perception and action (Thompson, 2007). Hence, the enactive theory of perception (or what might be termed the sensorimotor approach), sustains the idea that our ability to perceive is constituted by our possession of sensorimotor knowledge; perception is not something that happens to us, or in us, but it is something we do (Noë, 2004). The lived body is always directed toward perception and action, and thus the body shapes our intentionality, our primary way of being in the world. The lived body and the world, perception and movement are intertwined in a dynamic relationship which establishes a unique basis for our ability to merge situation, space and time into one experience, and thus, use our corporeal existence to signify and symbolize the world.
- 10 This ability is exhibited through the phenomenon of embodied metaphor, as being a vital ordering principle of all our sensory processing and image making, or to put it differently, sensory perception in itself is already an act of conceptual classification and organization of our existence. Perception is always selective and even at the most primary levels of processing it is already an act of categorization - neurophenomenology surpasses the mind-body dichotomy precisely through the idea that perception is a kind of cognition in itself; the meaning is embedded in the perceptual act right from the beginning. The supporting reason lies in the tight interconnections between perception, action and our emotional system: emotions provide initial information about the world, about the positive or negative value an object or event might have for the organism, and therefore have a key position in the circular causality of action-perception cycles (Thompson, 2007). Accordingly, described in a rather simplified manner, what we perceive and attend to is always guided by emotions; emotions direct our attention, our attentive state influences our perception and what we perceive is reflected in emotional experience, and so the loop goes on. In neurophenomenological terms, this is possible

because the nervous system, body, and environment are highly structured dynamic systems, coupled with each other on multiple levels. The neural dynamics underlying the emergence of cognitive-phenomenal states should be understood as being necessarily embedded in the somatic contexts of the organism as a whole (*i.e.* the lived body), as well as in the context of environment (Lutz, Thompson, 2003; Thompson, Varela, 2001).

- 11 Therefore, the metaphor is doubly embodied – first, as an unconscious neural process, and second, because metaphors are generated from bodily feelings (Modell, 2003). Originating in sensory-motor activations occurring in the body, these metaphors can be defined as the first, pre-selected interpretations of our corporeal existence, or primary bodily metaphors. Of special interest and architectural relevance are the spatial and directional existential metaphors of verticality, balance, up/down, front/back, stillness/movement, etc. This is because the way the world is structured and an organism can interact with it, depends first and foremost on the conditions of organism’s embodiment. For instance, the intensity with which we experience a colonnade resides in the fact that the defiance of gravity is measured against our upper posture and its dynamics and rhythm in our capacity of movement. Specifically, it is through such metaphoric expressions which directly relate and emanate from the human body that we are able to build upon elementary qualities of perceptual experience and allow for a conceptual grasp of non-physical, abstract meanings (Lakoff, Johnson, 2003).
- 12 For this reason, it is possible to speak of corporeal imagination, as a fundamental functional mode which allows the process of mapping bodily experiences and transferring the meaning from different sensory domains to abstract concepts (including the formation of higher-consciousness ‘products’ such as language and cognition in general, and thus, the possibility of reflecting on architecture). Interestingly, although the origin of a metaphor is profoundly corporeal, we commonly presume that our thoughts and experiences are the result of disembodied higher-order processes; yet without these embodied metaphors it would be impossible to achieve the coherence and meaningful wholeness of our experience. In architecture, this is what Arnheim, as long ago as the 1960-70s, recognized as the effect of archetypal architectural experiences – sensory symbols are the most powerful architectural metaphors because they originate in the embodied metaphor as a distinct source of intense and deeply meaningful architectural experiences (Arnheim, 1977, 2009). That is to say that architecture’s ability to truly bring “the world into the most intimate contact with the body” (Pallasmaa, 2005, p. 60), and how this encounter is going to be apprehended and interpreted in the mind of the experiencing individual, depends to a large extent on bodily metaphors, arising within the body from both internal and external stimuli. Given the multi-sensorial nature of the experience, it can be implied that the first impression and/or signification of the architectural environment is always a result of the intrinsic cross-modal, bodily responses to the spatial and material – the perceivable qualities of an architectural work. This is in accordance with the essential feature of perception – it is the only means by which a body participates in the world, while at the same time, the act of perception is possible only if an individual renders herself present to something through the body (Merleau-Ponty, 1945, 1962).
- 13 Notably, it should be mentioned that emotions, by definition, are “somatic, visceral, electrical, and chemical events” (Mallgrave, 2013, p. 13), and as such they are a bodily system of values through which humans approach and evaluate the environment. This implies that they are precognitive actions and precede conscious understanding or

interpreting of the built environment. And because we respond to our surroundings through multiple corporeal senses, neurologically connected, emotions are deeply embedded in every architectural experience from the beginning, which is contrary to the currently presupposed emotion-free response to understanding architecture and thus, its abstract ideas (Mallgrave, 2013). Currently, there is evidence that by measuring autonomic responses like heart-rate variability (HRV) and electrodermal activity (EDA) it is possible to track and describe people’s emotional reactions during the perception of an architectural environment. Such data can indicate whether a particular space is experienced as pleasant or stressful, and this functional bodily mechanism could eventually be transformed into a helpful experiential simulation procedure for design evaluation. Moreover, it has been observed that people remember emotionally arousing events particularly well (Eberhard, 2009), meaning that memorability of architectural experiences relies on the strength and depth of the triggered emotional responses.

Corporeal schema and proprioception

- 14 One of the very insightful attestations for the indispensability of the phenomenal body as an architectural subject can be found in a bodily phenomenon known as the corporeal schema. It can be defined as a system of processes which constantly regulate posture and movement – sensory-motor processes which function without reflective awareness (Gallagher, Zahavi, 2008), while providing indispensable support in capturing the spatial and temporal conditions of a situation as a whole (Vesely, 2004). One of the main characteristics of the corporeal schema is that it involves a set of tacit performances which manage posture and movement, and because – being preconscious – these regulations are accomplished in a close to automatic manner (but still precisely shaped and governed by [conscious] intentionality). This allows for what is termed *experiential transparency* of the body – for the most part of everyday experience, (conscious) attention is directed toward the environment or a goal-directed action that the subject is undertaking, while attentiveness to the body itself is highly attenuated (Gallagher, Zahavi, 2008). In architectural terms, this bodily phenomenon is of particular interest by being a possible source for understanding different user behaviours in relation to the frequency, duration, and intensity of user experience. This capacity of the body to engage with architectural spaces without conscious attention⁷, only adds importance to thinking neurophenomenologically about the plausible effects of design decisions. In fact, by grasping the bodily mechanisms involved in our engagement with architecture, it would be possible to inform the design of built spaces to include environmental considerations that can minimize negative or maximize positive physiological, cognitive and emotional effects (Upali, Debajyoti, Hessam *et al.*, 2013) depending on the kind of architectural experience required.
- 15 If it is considered that the primary qualities of architectural spaces are to a large extent experienced precisely through pre-reflective body-architecture interactions, it implies that the corporeal-schema mechanism can be used as a communicative point whether to induce or inhibit conscious attention toward the architectural setting. The body itself is a delicate point of access, and it can be argued that the essential effort of all design thinking is in fact, directed toward achieving a desired dialogue between bodily systems and architectural spaces. Examples from architectural history show that architects had an intuitive awareness of this corporeal working, and it has been applied through the

design act of temporalization of architectural experience. In such a manner, the interconnections and play between matter and space are emphasized (Drake, 2005), providing us with a time delay to become consciously aware of our own status as oriented beings⁸ and what it is that we are experiencing. As an illustration, it is worth noting that architecture itself has the capacity to act as if it were experientially transparent, or in other words, to fade into the background in order to be *life-enhancing*, to have a silent but permanent impact on the minds and bodies of users, while only occasionally being experienced consciously. In order for architecture to be supportive of life, it has to achieve a fragile equilibrium of appearance and disappearance (Baudrillard, Nouvel, 2002); the architectural artefact has essentially evolved so as to be “a backdrop for everyday life” (Leatherbarrow, 2009, p. 207). As a matter of fact, in recent architectural literature, such works have usually been cited as exemplary in their attention to design details in terms of material, light and overall spatial, atmospheric qualities, and their main designing principle seems always to originate in the nature of the human body and multi-sensoriality of architectural experiences⁹.

- 16 It is a commonly accepted attitude among architects that architecture is inextricably related to movement, or, as can be summarized in Holl’s words, the only real test of architecture is the enmeshed experience, which emerges from “the continuous unfolding of overlapping spaces, materials, and details” (Holl, Pallasmaa, Pérez-Gómez, 2006, p. 45). The experiencing subject is always an ambulant perceiver, a human body in its totality moving through space. This is the only way of understanding the idea and the phenomenal qualities of architectural work. This long-established architectural rationale can now be confirmed and elaborated from a neurophenomenological viewpoint. What lies behind the possibility of establishing spatial ordering through movement and allowing for continuity of perceptual experience is one of the key functional mechanisms of corporeal schema – the sense of proprioception (postural and kinaesthetic information). It is a sensory means by which the body informs us of the position of our limbs as we move through space, and it is a rather complex physiological process which constantly affects muscle tone and tensions, head, eye, and body movements, while providing us with the dynamic feeling of our bodies as animated. Thus, proprioception can be described as the only system of reference we possess which is able to endow us with a coherent understanding of our spatial situation. Simultaneously, proprioceptive awareness provides an immediate experiential access to our own, pre-reflective, embodied self, independently of reflective thinking, which is essential for all perception since it requires co-experience of self and environment, in order to be a comprehensive informational system (Mallgrave, 2013). In fact, the relation between perceiver and perceived is a delicate point of potential influence, because even slight changes in our bodily postures, movements, physical abilities (in our corporeal schema), can affect our proprioceptive understanding of ourselves, and even considerably alter our external spatial perception. In other words, the corporeal schema is one of the most valuable design instruments an architect can use to achieve a desired bodily and emotional state, all according to the functional and brief requirements of a certain architectural space.
- 17 A particular architectural value of this sensory mechanism is to be found in the fact that to organize and interpret perceptions of spaces in a unified and meaningful manner, the phenomenal body itself has an intrinsic requirement for movement. Human beings are biologically and evolutionarily predisposed to engage in actions promoting behaviours of *play* and *seeking* (or pursuit). These activities are natural explorative behaviours

supplemented by a strong emotional charge. Through the brain’s reward mechanism, they stimulate our minds and bodies in search of positive achievements, which ultimately can bring existential meaning into our life (Mallgrave, 2013). Clearly, movement is intrinsically related to these emotional conditions, and therefore, combined architecturally, the result can be a set of useful design tools, especially for creating spaces where a certain degree of seduction and intricacy is desirable. For example the architecture of public spaces frequently uses these inherent traits when forming connections in the manner of winding, serpentine paths, and at the same time employing the design strategy of gradual spatial unfolding. The result is a space, which by deliberately avoiding full disclosure, and providing incidental or incomplete views, invites movement and exploration. Concurrently, such involvement with architectural spaces positively stimulates the brain and gives artistic merit to ambiguity, as a way of allowing freshness of experience and possibility of reinterpreting the meaning with every new encounter (Mallgrave, 2011; Zeki, 1999).

Mirror neurons and embodied simulation as new empathy

- 18 The phenomenon of mirror neurons is one of the discoveries in the field of neurosciences which has had an immense effect on various areas of knowledge of human nature. Its architectural relevance lies in the fact that the mirroring mechanism scientifically validates the idea of empathy (as *Einfühlung*) as a way of explaining how architecture is understood through our own corporeal form and sensory-motor experiences. The specificity of mirror neurons is in the activation of the same cortical areas during both first and third-person experience of actions, emotions and sensations. More simply, the same brain activity is observed when executing and observing a certain action. As a consequence of these neurons firing – what some scientists call embodied simulation – it is possible for a human individual to have a second-person perception (what might be also termed social perception), and thus have a “direct experiential understanding of objects and the inner world of others” (Freedberg, Gallese, 2007, p. 198). Therefore, empathy can be defined as an “unconscious process in which the individual uses his own body as a template that enables him to feel into the other’s experience” (Modell, 2003, p. 121). In addition, the mirroring mechanism is what can be claimed to provide a neural explanation for intersubjectivity – an issue which should not be overlooked since architecture is ultimately a social art. With this in mind, remarkable studies from more than a century ago, by Robert Vischer, Adolf Göller and Heinrich Wölfflin¹⁰, to mention but a few, looking at how architecture engages the observer’s bodily responses and why everybody feels the expressive power of architectural forms, can be seen as verified assumptions (Mallgrave, 2011), and moreover, as issues worth investigating further by employing the most recent neuroscientific research¹¹.
- 19 We should emphasize that the activity of mirror neurons and related empathic mechanisms provides us not only with social cognition, but also enables us to animate the inanimate physical environment with which we come into contact. In other words, we are intrinsically equipped with the means to apprehend and form a relationship with our built surroundings, and this connection always has a multi-sensory and emotional aspect to it. Importantly so, for being a deeply embodied process, it is for the most part elaborated in a pre-reflective manner.

Design and the embodied mind

- 20 The neurophenomenological approach to architectural experience can be also seen as an indication of a steady way of training professional sensitivity to cultural and natural conditions and overall site and design requirements. In fact, the insights into the phenomenon of brain plasticity and some recent studies (for example, Kirk, Skov, Christensen *et al.*, 2009) have shown that during their professional training architects develop a mental capacity for experiencing and thinking about architecture, which can be quite distinct from the majority of architecture users. As Mallgrave advocates, architects acquire the ability to understand and create metaphors and symbolism in architecture which are predisposed to operate as semantic references, on a highly abstract plane of thought not widely accessible (Mallgrave, 2011). In addition, because of the neural connections and mapping which have adjusted itself to the specificity of professional education, there have been indications that architects also have a distinctive emotional response to architectural spaces in general, in contrast to other subjects without architectural background. Although this conclusion was to be expected, its implication is still important as long as architecture is designed so as *not* to be understood and experienced with the architect’s brain. For this reason, there is a need to employ a neurophenomenological approach in order to raise architects’ awareness and knowledge of the embodied nature of every architectural experience. The idea of designing “pre-reflective” architecture is the appeal to acknowledge the phenomenal body as the true architectural subject. By the same token we must also accept that any work of architecture is always experienced pre-consciously, and that in most cases this primary understanding is also the only one.
- 21 On the other hand, what previously mentioned neurophenomenological concepts imply is that architectural design is also an embodied process – it is a neurological activity which always involves metaphorical thinking and image-making, and as such it is perceptually driven, and intrinsically material, textural, and spatial in nature. Moreover, because it is grounded in embodied metaphors arising from bodily and emotional states, design thinking as a mental process does not correspond to the objective representation of space which serves as a basis for almost all the tools used in everyday architectural design and representation. The challenge thus arises when two ways of conceiving space come face to face, usually ending in the negation of visceral nature of the architect’s thought by transcribing it with its conceptualized, bodiless architectural expression in accordance with instrumentalized physical-mathematical notion of space. Or in other words, when architects refer to design they assume it to be a mental activity, simply of a higher order of consciousness, concerned with arranging forms, spaces, program, and materials (Psarra, 2009). The fact which is overlooked is that conceptual and abstract thinking and dealing with 2D and 3D drawings, models and representations of space is built on the embodied condition. In contrast, if they are to *speak* about a building, which is seen as something to be experienced, it is often described as “a narrative invoking a hypothetical viewer and a journey through space” (*ibid.*, p. 66). As a consequence of such a flawed preconception about the nature of design, a discrepancy is created between the two views of the same architectural work, reducing architecture to a duality of the conceptual realm and the reality of bodies in physical space.

- 22 In this sense, the neurophenomenological approach to design provides for the awareness of architects, not only regarding the corporeal existence of an architectural subject, but also the design process itself, and the ever more necessary attention to its embodied essence. Understanding these neuro-groundings could help us to build adequate simulation tools to support the design process¹², and make us aware of the basis for our design rationale, while grasping our intuition. Knowing our architect’s brain neurophenomenologically means being able to advance better arguments for design decisions.
- 23 An interesting incentive can be found in Onians’ neuroarthistory¹³ and the idea that architects should also bear in mind that every life-event and living condition wires their brains in a particular way which indirectly affects their overall design thinking (Onians, 2007). Undoubtedly, the extraordinary plasticity of the brain is the reason why it is possible to develop specific design-and-architecture-oriented minds and thus create remarkable works. There are many reasons to fear that the current prevailing reality of instrumentalized and virtual images will irreversibly alter the way we think as architects, so that our brains become design-insensitive to the architectural requirements of our immutable corporeality and embodied existence. Therefore, the lack or absence of such (neurophenomenological) awareness could result in an ever increasing discordance between the built environment articulated according to artificially conceived spatial concepts and the phenomenal world in its anthropological, multi-sensorial dimension. Conversely, by being alert to the potential of current and prospective neuroscientific findings, there will certainly be an opportunity to modify or invent design tools which could provide more accurate simulations of our perceptual experiences.

Conclusion

- 24 In contrast to the tendencies of the Age of the Image and the Virtual, the correlation between the architectural environment and the minds and bodies of its dwellers is being steadily confirmed, implying that the overall well-being of people – both physical and mental – strongly depends on architectural settings and the quality of everyday architectural experiences. In other words, architecture is “our primary instrument in relating us with space and time, and giving these dimensions a human measure” (Pallasmaa, 2005, p. 17). For these reasons, it is important for architects to recognize that the spatiality of the lived-world is a spatiality captured not by geometrical measurements but by contexts of use (Bollnow, 1963, 2011), and that our primary response to the world (which is always two-way interaction) is what is to the world as perceived (meaning, formed and influenced by our embodiment) and as such it may differ extensively from the information coming from objectively constructed spatial designs.
- 25 If architecture is to be understood as having a unique cultural assignment, a “plausible spatial matrix for the rest of the culture” (Vesely, 2004, p. 103), it is possible only on condition of respecting the “irreducible and silent presence of the body as our transhistorical ground” (Holl, Pallasmaa, Pérez-Gómez, 2006, p. 22). A promising approach to accommodate this requirement is to be found precisely in the architecture-neurophenomenology dialogue. The notion of “pre-reflective” architecture is fundamentally a valuable reminder of the fact that the essence of a strong emotional and corporeal experience, even of an architectural element as simple as a staircase, has its source in the bodily response to our earthly conditions.

- 26 Although the intricacy of architectural experience cannot be explained entirely in neurophenomenological terms, it is nonetheless crucial to acknowledge the new evidence of emotional and overall bodily responses persisting in every architectural encounter. Consequently, a purely cognitive and disembodied approach to designing and understanding architecture is merely a misapprehension, because the only possible originating point of any sort of conceptualization and abstraction lies in the phenomenal body.
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NOTES

1. In the late 1980s, fundamental changes in cognitive sciences were motivated by the observed inadequacy of a disembodied view of the mind, reintroducing the debate on the issue of phenomenal consciousness in terms of the so called ‘hard problem’ of consciousness – that is, the problem of how and why physiological processes give rise to experience and phenomenal mind. To surpass the mind-body problem as the “hard” problem of irreconcilable views, it was necessary to rethink the typical distinction between the first-person and third-person perspectives commonly present in philosophical and scientific discussions of consciousness (Thompson, 2004; Gallagher, 2011).
2. Neurophenomenology as a research program has first been defined by cognitive neuroscientist Francisco Varela (Varela, 1996) with the idea that “*disciplined first-person* accounts should be an integral element of the validation of neurobiological proposal” (*ibid.*, p. 344, original emphasis). Importantly, neurophenomenology is referring to the entire array of issues pertinent to cognitive sciences, and thus, neuro- is just a functional simplification of what would be neuro-psycho-evolutionary-phenomenology (Varela, 1996). For a good introduction to the essence of neurophenomenological perspective, see (Varela, 1996; Gallagher, Zahavi, 2008; Thompson, 2007).
3. In spite of the fact that some of these neuro-findings are being demonstrated as rather important for aesthetic appreciation of the arts, it should be noted that this essay is concentrated more on understanding the essentially embodied nature of architecture-body encounter and its crucial mechanisms than on the subsequent aesthetic dimension of architectural experience.
4. The space limit of this essay does not permit a more detailed analysis of these essential neurophenomenological concepts. For crucial references on this topic, see (Varela, 1996; Thompson, 2004, 2007; Thompson, Varela, 2001; Gallagher, Zahavi, 2008, Varela, Thompson, Rosch, 1991) as well as other works by Varela et al., Thompson et al., Gallagher et al., to name but a few.
5. For a detailed discussion on the concept of enaction, embodied action and sense-making in the context of neurophenomenology and enactive approach, see for instance (Thompson, 2007, Varela, Thompson, Rosch., 1991).
6. Essentially, at methodological and experimental level, it is presumed that phenomenologically precise first-person data produced by employing first-person methods provide strong constraints on the analysis and interpretation of the physiological processes relevant to consciousness (Lutz, Thompson, 2003).
7. However, it should be borne in mind that brain areas devoted to acquisition of spatial characteristics of the environment, like landmarks, and locating the body’s position, are being active whether or not we are paying attention to our spatial locations.
8. Consciousness takes time, while the perceptual judgments (of spaces) are built-in processes, which are automatic and unconscious.
9. There is an interesting overlap of ideas about the task of architecture and the embodied nature of architectural image as a requirement for gratifying an authentically human experience – to mention just a few – the well-known atmosphere of Zumthor’s architecture exposed to life (Zumthor, 1999), Pallasmaa’s architecture of weak image which is contextual and responsive to life (Pallasmaa, 2011), and Nouvel’s and Baudrillard’s notion of invisibly present architecture, which should not be experienced constantly, but needs both to exist and be quickly forgotten in order to sustain life events (Nouvel, Baudrillard, 2002).
10. In addition, there are a number of architectural thinkers whose theories and writings are regaining importance precisely on the account of these recent findings. For example, Neutra’s

advocacy for survival through design based on the embodied nature of the architectural subject *i.e.* human body, written sixty years ago, can be today neurophenomenologically supported, making it a significant and contemporarily valid approach to think the future of architecture and design process (Neutra, 1954).

11. Although currently there are not too many studies directly related to architectural field, the large body of research dedicated to other arts and our engagement with the world in general, provide sufficient clues for rethinking architecture in these new terms, and moreover, there should not be any doubt that architectural design and thinking will surely be affected by further investigations and can have invaluable benefits.

12. An example of such efforts are the experimental studies regarding various aspects of architectural experiences that are well under way, and that should lead to our increased understanding of neurobiological underpinnings of our body-architecture relationship. On the other hand, a good example of a design evaluation tool is the StarCAVE system – a large, human scale virtual reality facility, developed by a multi-disciplinary group of scientists, led by Eve Edelstein and Eduardo Macagno, at California Institute for Telecommunications and Information Technology (Calit2), University of California San Diego (UCSD). This is a novel immersive environment tool for displaying and testing the user’s experience and responses to life-sized design spaces. It offers the experiencing subject the way to modify and move through these, essentially, 3D renderings of an architectural space, while at the same time includes the ability to render and change visual and auditory environment in real-time, while monitoring user’s responses. This is certainly a prototype example of how such evaluation tools in the future of neuro-architecture might look like.

13. Neuroarthistory can be seen as an attempt to reconstruct the unconscious intellectual formation of the makers, users, viewers, and ultimately, those who have been writing about art, and highlight the strong impact this formation has had on the making and understanding of the artworks (Onians, 2007).

ABSTRACTS

The essence of the neurophenomenological “twist” in architecture resides in its particular strength for a more concrete approach to the issue of architectural experience in its multi-sensorial richness. By placing human experience at the centre of architectural design – acknowledging the phenomenal body as the only genuine architectural subject – this specific union of the latest neuroscientific research with the extensive phenomenological legacy can offer valuable insights for interpreting our embodiment and how we relate with our architectural environment. Accordingly, the notion of “pre-reflective” architecture emphasizes the fundamentally embodied and largely pre-conscious interdependence of architectural spaces and our perceptual experience. In a nutshell, the neurophenomenological investigations of architecture aim to identify and approximate the conditions of embodied experience of architecture, while revealing that a purely conceptual engagement with architectural spaces is only a misconception. Also, it raises awareness of the embodied nature of the design process itself, and the need to be attentive to the discordance between the architectural tools for design and representation, designed on the basis of a physical-mathematical conception of space, and the spatiality of the phenomenal world in which we live.

L'essence du « tournant » neurophénoménologique en architecture réside dans son attention particulière pour une approche plus concrète de la question de l'expérience architecturale, dans toute sa richesse multi-sensorielle. En plaçant l'expérience humaine au centre de la conception architecturale – reconnaissant le corps phénoménal comme le seul véritable sujet architectural – cette union spécifique entre les dernières recherches neuroscientifiques et l'ensemble de l'héritage phénoménologique, peut offrir des points de vue nouveaux pour interpréter notre agir incarné et la manière avec laquelle nous interagissons avec notre environnement architectural. Par conséquent, la notion d'architecture “pré-réflexive” fait valoir l'interdépendance fondamentale entre les espaces architecturaux et notre expérience perceptuelle. Celle-ci dépend largement du traitement préconscient et profondément intériorisé des stimuli internes et externes. En résumé, les recherches neurophénoménologiques sur l'architecture cherchent à identifier et approcher les conditions de l'expérience incarnée de l'architecture, tout en montrant qu'un engagement purement conceptuel avec les espaces architecturaux est une erreur. De plus, elles sensibilisent à la nature incarnée du processus de conception lui-même, et à la nécessité d'être attentif à la discordance entre les outils architecturaux de conception et de représentation, conçus sur la base d'une interprétation physico-mathématique de l'espace, et la spatialité du monde phénoménal dans lequel nous vivons.

INDEX

Mots-clés: Neurophénoménologie, expérience architecturale, incarnation, éaction, perception, corps phénoménal

Keywords: Neurophenomenology, architectural experience, embodiment, enaction, perception, phenomenal body