

Paper No 329: The notion of medium in architectural teaching or, how would we teach architecture if air was water?

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Abstract

This paper assumes that the integration of environmental issues in the design process would be spontaneous and meaningful if the notion of 'space' in architecture was considered as 'medium'. To clarify this stance the authors depict the idea of space as a geometric entity, highlighting its abstract nature. Then, by using Gibson's description of the terrestrial environment the notion of medium is presented, from which a new approach to design is suggested. In order to illustrate this approach a studio experience developed at the School of Architecture of the University Of Santiago De Chile is provided. Finally, conclusions upon this new approach are synthesized, being the reordering of the design process one of the most important ones.

Keywords: education, environment, space, medium

1. Introduction

An important part of the literature regarding the integration of knowledge in the studio focuses on curricular, procedural, pedagogical, attitudinal, and psychological issues. [1-6] Nevertheless few authors have questioned the current convenience of traditional concepts within the very practice of architectural design in order to promote that integration.

One of these concepts is that of 'space', so relevant in architecture for almost a century [7] and so ubiquitous in our daily life that nobody seems to need an explanation on what 'space' is, including of course the students of architecture.

This paper intends to show the disadvantage of the current approach to 'space' in contrast with the convenience of the concept of 'medium' in order to promote an integration of environmental issues into the design process.

2. Space as geometrical entity vs. Space as Medium

2.1 Space as geometrical entity

The origin of space as a geometric entity in architectural training could be traced 80 years back to the influential Bauhaus in Germany. Facing the dilemma of 'teaching space' in 1928, Laszlo Moholy Nagy, rejects Gottfried Semper's assertion that the first impulse of architecture is 'the enclosure of space' and turns the school to the opposite direction. Architecture, he would write, will no longer be understood as a "shelter from the cold or the danger, but as a creation in the mastery of the space experience" [8]. The mastery of space experience, we will then see, refers to a bold compositional arrangement of

walls, floors and roofs, which no longer make up an enclosed volume -the enclosure of Semper-, but a group of apparently floating planes among which "the space flows". Though Moholy-Nagy seems to value the 'biological conditions' of this new conception of space, he is not talking about a fluid in the traditional physical-chemical sense, such as air, but essentially about visual relationships.

90 years later, though now without the messianic modern attitude, an important part of architectural education in the initial studios still use to arouse a three-dimensional awareness in the students and within it a critical sensitivity for distances or proximities between solids. After all, the articulation of geometric space remains a skill sine qua non for students of architecture.

In that context is not difficult to understand that the schema of space that students attain is essentially an interval between the solid elements of a building in order to accommodate objects or activities. In other words, space is the part of the environment in which we operate and that is delimited by solids, being this the only one feature that space and medium share as we shall see later.

This customary understanding provides an order of precedence where the first elements to appear in the mind of the designer are the solid ones. Though they lack a concrete materiality at an early stage they are able to give existence to the space as geometry. Conversely, we shall see later, to what happens in a process based on environmental conditions since the beginning.

In this logic, just as happened in Moholy-Nagy's Bauhaus, the architectural space is an abstract by product, not a thing in itself. The atmospheric

qualities -and the tectonics definition- will be, so to speak, applied later.

We want to emphasize that the very genesis of this 'space' evades the environmental condition. In our view, this understanding legitimizes for students the division between form and environment.

2.2 Space as Medium

How would we teach architecture if air was water? Of course this is not a practical question; however it motivated on us an inchoate scepticism on what we usually call space. If air was water we would probably not associate the idea of space to a mere interval between solids as we tend to think in architectural design, but to something that is palpably surrounding us and, what is more important, affording our life: this is a medium.

Our suggestion is certainly indebted to James Gibson [9] [9] who claimed that the terrestrial environment can be described by three terms which are superior to the traditional classical physics description of bodies in space, in particular if we want to understand our environment as meaningful. These terms are: medium, substances and surfaces

Gibson himself asserted some years before [10] that the air was what we commonly call space, but later he corrected his initial statement and established a clear-cut difference between the idea of space and that of medium. Space in his vision is not meaningful, and it is not because it is an abstract and homogeneous entity. For Gibson, meaning equates information, such as the nauseating smell of spoiled food, or the temperature and the flavour of seawater used as an orientation means by certain Polynesian navigators.

To understand the implications that the three Gibsonian concepts may have in architectural space conception it's worth making a brief summary. In coincidence with the ancient Greeks, Gibson argues that our world can be described by states of matter. In his discourse, the solid state is called substance, and the gaseous state is called medium. The liquid state is not a natural environment for human life though it is for other animals. The interface between these states of matter - solid, liquid, gas - constitutes a surface. To the planet scale, the sea/air interface is a surface, as it is the interface wall/air to a building scale. In Gibson's approach, surfaces have a special relevance in relation to visual perception due that any action of light occurs on surfaces.

For our purposes, however, we will focus on the potentials of the medium. The medium seen from an ecological point of view has 6 essential characteristics. 1. being "insubstantial" it affords the locomotion of animate bodies. This coincides with the idea of space 2. Being generally transparent, it affords vision, 3. Being capable of

transmitting vibrations or pressure waves it affords the sensing and listening to vibratory events, 4. Allowing rapid diffusion it affords detecting chemical substances from a distance in what we call smelling, 5. Containing oxygen it affords the chemical substances exchange in what we call breathing. 6. The medium has an inherent polarity of up and down given by gravity [9].

3. Implications on architectural design and teaching

In principle we could agree that an essential role of architects is to manipulate space for human inhabitation. Nevertheless the notion medium adds a new dimension to the manipulation of space. In it, the desired environmental condition would play a central and opening role in the design process, as we will see in a following example. At the same time, some other design mechanisms, currently central in architecture like volumetric articulation, would still play a relevant role but always and only as function of the desired environmental condition.

From a pragmatic point of view, we can say that while for land animals their medium is basically air, in the case of humans in turn, air has to be frequently, in Banhams' term, 'domesticated' to become optimum. In this perspective, an essential work of an architect would be to domesticate the medium, and consequently, the teaching of architecture would consist in how that domestication could be achieved.

Two aspects of this approach that could affect current teaching and assessment methods are.

1. The full understanding of the medium is a multisensory process, whereas the understanding of space is mainly visual. For implications on Sensory Design see [11]
2. Manifestations of the medium are not static but varying in time. For implications on environmental diversity see [12].

Then, the notion of space as medium poses a reconsideration of what the means and ends of architectural design are. Consider the central place of geometry in the design process. But also, and what is more relevant, a shift of paradigm from the ocularcentric paradigm [13] to the multisensory/environmental one. [11]

4. Studio experience at the University of Santiago de Chile

To illustrate this approach a studio experience held at the School of Architecture of The University of Santiago in Chile, with students starting their second year is provided.

In order to test the potential of the concept of medium to activate a design process, the students had to meet three compulsory conditions:

1. The concept of design had to be exclusively environmental though not necessarily related to comfort or energy efficiency.

2. Before drawing any diagram, the students had to identify and communicate verbally which environmental condition they were aiming to, maintaining this statement until the end of the process.

3. The building proposed had to produce a memorable experience to the visitor in the way suggested by Tuan [14], i.e. an experience of the medium through the senses.

The brief, which was an excuse to create a memorable medium, required from the students to design a building without practical functions in order to liberate them from the laboriousness of functionalist details. The building in question was a memorial for the poet Pablo Neruda located on a site with dramatic environmental and topographical traits: A cliff 70 meters high manifestly exposed to the natural phenomena, that is, the strong wind of the Chilean seashore, the sound and humidity of the waves, and long sunsets on the immense Pacific Ocean. Part of our strategy was aimed at confronting environmental physical phenomena against poetry, knowing that one of the risks of this exercise was the natural predisposition of students to speculate about feelings and moods when addressing 'poetic' issues.

On a first step the students had to understand the site. To this end several visits to the cliff at different times of the day were made. At this point students had to make contact with some environmental phenomenon that resembled any aspect of the poetry of Neruda. For example: a special quality of light, the strength and sound of the wind, the palpable moisture of the atmosphere, the fluctuation of the temperature during the day, etc.

On a second step, students already in possession of their chosen environmental phenomena, had to declare what they intend to do with them, and begin the design process itself. This mainly consisted in experimental work of trial and error in the studio, starting with a 'geometric hypothesis'. This geometric hypothesis consisted in a very rudimentary cardboard model to be tested in the laboratory. For example, if a student wanted to 'build' a medium where wind could reach greater speeds than those that it naturally does, and eventually could produce sound, "whistle and sing" in the words of Neruda, then she had to test her model in the wind tunnel, improving successively the configuration and attuning dimensions until her goal was reached.

Not only had the speed of wind to be simply increased, a sequence of paths, thresholds and places had to be created where visitors could experience the modified medium.

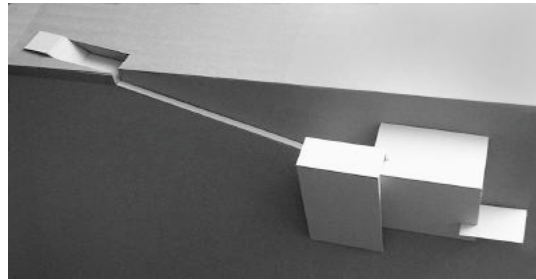


Fig 2. Memorial for Poet Pablo Neruda. Final Model
Student Paula Vallejo

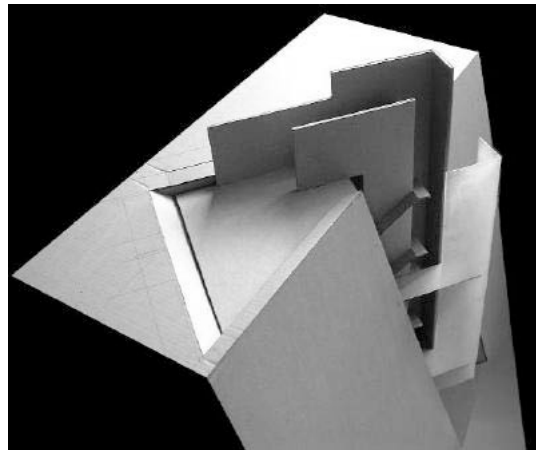


Fig 1. Memorial for Poet Pablo Neruda. Final Model.
Student Rodrigo Alvarez

Another case in point was a student trying to capture and lengthen as much as possible the light of dusk, one of the young Neruda's usual themes. In this case, the experimentation dealt with reflexions, transparent planes, translucent or opaque screens in order to bring under control the light and create the atmosphere announced at the beginning of the exercise.

5. Discussion

The exercise described above was not aimed at technical accuracy, but to introduce students in the notion of medium through a motivating and practical undertaking.

In it, students approached the idea of space, not as a void between solids that needs to be 'stuffed' with environmental qualities at some future point. Instead, they started from envisioning a portion of medium made memorable through architectural operations. In doing so, they started from what is normally positioned at the end of the design process. As a consequence, environmental issues were deemed essential in the exercise from the beginning.

In summary, what is different in this process? Basically it is the kind of design concept employed (environmental), the kind of exploration underpinning the design hypothesis (experimental-inductive) and finally the order of the process. (Table 1)

Table 1 . Design order comparison

Medium	Space
Declaration of the desired Medium	Design Concept
Design Hypothesis (Rudimentary physical model for testing)	Rudimentary scheme
Testing and modification of geometry according the behaviour of the medium	Successive steps of theoretical optimization according tutor/pair reviews
Refinement	Eventual 'environmental stuffing' and testing on predefined geometry. Eventual little modifications
Final form	Final form

In this scheme, architecture is conceived in the architect's mind the opposite way of how it is built. To explain this, Cabrera (2003) uses the strange but inspiring idea of "designing" a tree for a sunny place. "The architect, he says, first imagines the shade, then imagine the leaves blocking the sun, then the small branches that hold the leaves, then the robust branches supporting the small ones, then the trunk, and finally the roots"

The yearning for the shade is what motivates the rest of the process.

6. Conclusions

The intention of this paper was to contrast two ways of understanding the space in the context of design activity in the studio. In the authors' view, these two ways have direct impact on how environmental issues are integrated into the design process.

The first one is the concept of geometric space, devoid of environmental conditions. The second one is the concept of medium, which is an environmental entity in itself.

If we understand the architectural space as a portion of medium with particular characteristics, it ceases to be the by product of the formal manipulation of the solid elements of a building, to become the ultimate reason for such formal and tectonic manipulation, in short it becomes an entity on its own merit.

By providing an example, where students became aware that geometric configuration can be determined by a desired quality of the environment, we have tried to show the potentials of the medium in architectural education. In our experience, its use greatly facilitates the understanding of environmental issues among students and most importantly puts these issues at the core of the process and not on the periphery as it is the case today.

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