Space Perception and Its Implication in Architectural Design

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Abstract

The paper intends to analyse the common ground between the field of visual perception *and* architectural design*. The architectural product always addresses a* user*, who will react in a certain way towards the architectural object, towards built space, towards her/his environment in general. This relationship is bidirectional and its effects are visible both ways*: we modify the environment through the designing process *(architecture, urban planning, design in general) and* the *(built)* environment modifies our behaviour. *In this context, it is crucial that we understand the functioning mechanisms of the perceptual processes - which will be detailed throughout the first part of the paper.* Perception *is indeed a very complex process, that involves* gathering *information through our senses;* processing *it - which implies analysing the received information and comparing it against previously gathered knowledge, based on past experiences; and* formulating particular responses - *also based on previous experiences. Perception is in essence a highly creative process: although we relate to the same reality, we will perceive it in a different way according to what that environment means to each of us. The second part of the paper will study several* parallel theories on perception *developed by architects, urban planners and psychologists. We will also pay special attention to several conclusions reached by Jean Piaget and Bärbel Inhelder upon the way in which perception develops from an early age. These studies are essential in establishing a growth and progression pattern throughout childhood, relating it to the different stages of the development process of space perception. Finally, the third part will present two case studies focusing on the manner in which users, with different cultural backgrounds, perceive the space they inhabit and, another two case studies, which show how and why users change their environment - cases in which the designer failed to produce spaces with meaning according to the users' paradigm.*

Rezumat

Articolul intenționează să analizeze teritoriul comun dintre percepția spațială *și* arhitectură*. Produsul de arhitectură se adresează întotdeauna unui* utilizator*, care va reacționa într-un anumit fel față de obiectul de arhitectură, față de spațiul construit, fața de mediu în general. Această relație este bidirecțională, iar efectele ei sunt vizibile în ambele direcții:* noi modificăm mediul prin procesul de proiectare *(arhitectură, urbanism, proiectare în general)* și mediul *(construit)* ne modifică la rândul său comportamentul. *În acest context este foarte important să înțelegem mecanismele de funcționare ale procesului perceptual - detaliate în prima parte a lucrării.* Percepția *este într-adevăr un proces deosebit de complex care înglobează* culegerea *de informații cu ajutorul simțurilor;* procesarea *acestora - ceea ce înseamnă analizarea informațiilor primite și compararea lor cu cunoștințele deja dobândite, pe baza experiențelor anterioare;* și formularea

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unor răspunsuri - *care se bazează, de asemenea, pe experienţele anterioare. Percepţia este, de fapt, un proces deosebit de creativ: deşi ne relaţionăm la aceeaşi realitate, o vom percepe diferit, în concordanţă cu ceea ce poate însemna mediul pentru fiecare dintre noi. A doua parte a articolului va detalia câteva* puncte de vedere care teoretizează percepţia, *formulate de arhitecţi, urbanişti şi psihologi. Vom prezenta, în mod special, concluziile la care au ajuns Jean Piaget şi Bärbel Inhelder legate de modul în care se formează şi dezvoltă percepţia de la o vârstă fragedă. Aceste studii sunt esenţiale pentru stabilirea unui model de creştere şi progresie de-a lungul copilăriei - relaţionându-l cu diferitele etape ale procesului de dezvoltare a percepţiei spaţiale. În final, în cea de-a treia parte, vom prezenta două studii de caz ce se concentrează pe modul în care este perceput spaţiul de indivizi ce provin din medii culturale diferite; şi încă alte două studii de caz, care prezintă de ce şi cum îşi modifică utilizatorii mediul - este vorba de situaţii în care spaţiul pe care îl locuiesc ei nu este în concordanţă cu paradigma lor de locuire.*

Keywords: *visual perception*, *space perception, meaning in architecture, architectural psychology, environmental psychology, environmental cognition.*

1. Defining the Perceptual Process

Architecture, as *the creator* of space, is the one to give physical form to this concept. This is why before creating it, we must, first of all, understand how we *see* space, how we *perceive* it. Thus, the last decades can be considered to have been an effervescent period during which architects and psychologists alike have been attempting to link architecture with the psychology of the individual, - seen as the user of these spaces.

Perception is the first step we take when interacting with space. It is the *interface*, our first contact with the surrounding environment. This is why, in a study, which is attempting to establish a relationship between the individual and their, environment, it becomes essential to identify what *perception* really is and how can this process influence our interconnection with space - as users and as designers, as well.

When speaking about perception, probably the best term that one could use is that of *concept*. And this because when trying to define what perception means, it becomes clear that there are a lot of sides to its meaning, which sometimes overlap and other times are merely tangent. This is why *perception* tends to be more than just a simple *notion*, therefore becoming *a concept*.

Defining *perception* is becoming increasingly difficult, precisely because it is the object of many interdisciplinary and transdisciplinary studies. Its definition tends to be broader or more restrictive depending on the field of studies that defines it: for example, in experimental psychology, perception denotes the manner in which stimuli act upon receptors. For social psychologists, it signifies the ability to identify objects within the social environment, but it also includes the image which the individual forms upon various events, people, objects linked to previous experiences. On the other hand, the field of geography defines perception in a much broader sense, including the whole range of percepts, memories, attitudes, preferences, thus comprising the entire information we poses related to an environment, in fact aspects that can be gathered under the term of *environmental cognition*. [1].

Psychologists involved mainly in the field of space psychology, are refining even further the concept, stressing upon acta differences between cognition and perception. The relationship between cognition and perception is sometimes of inclusion and other times they are seen as two separate, alternating processes. *Cognition* comprises all forms of knowledge: thought, imagination, reason, memory and, of course, perception cannot be overlooked, therefore, in this instance, it is a form of

figurative knowledge. From this viewpoint, the knowledge of the surrounding environment can be acquired in more than one ways and perception is just one of them. From a different perspective, perception is being influenced by the cognitive structures of the individual. These can influence the selective ability of perception and thus the image to be constructed is being refined and selected through the filter of attention. Summarising, perception can just as easily be defined as a subsystem of cognition but, just as well, as being a process of cognition, too. [2] (Fig. 1).
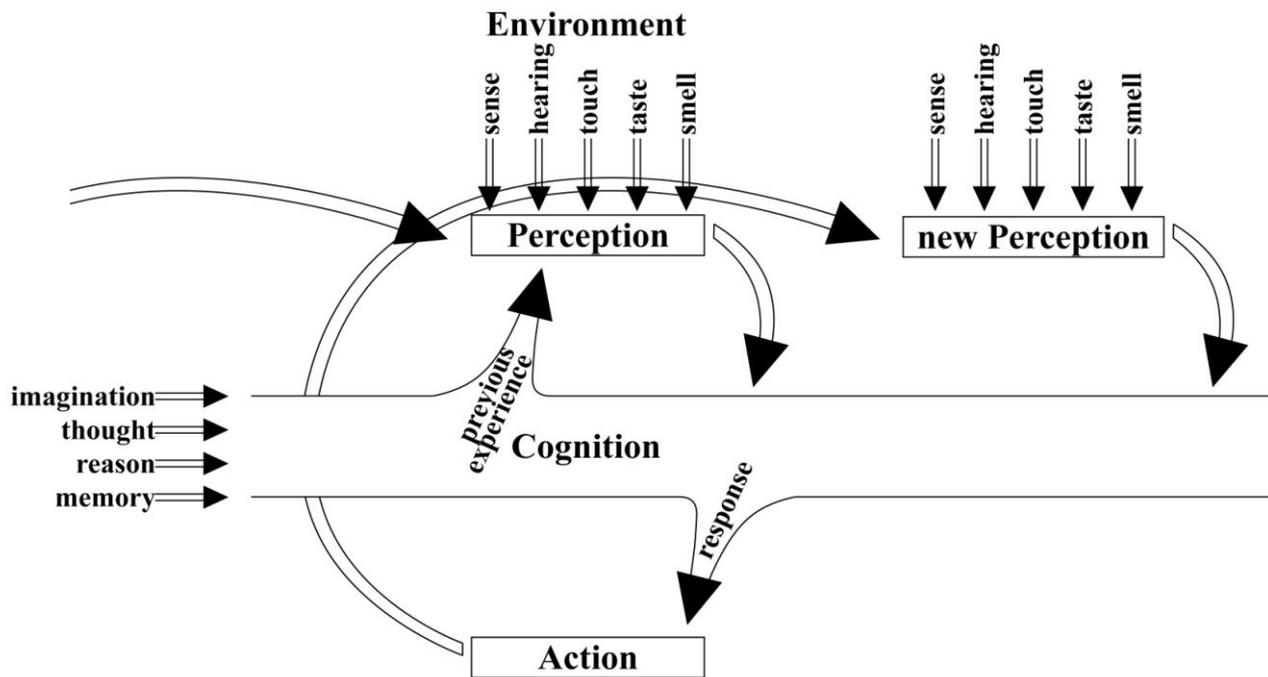
Figure 1. The relationship between perception and cognition.

Looking at it differently, at a lower level, we have *sensations*. Perception presupposes a superior degree of complexity in gathering and processing information. The resulting image, at the end of the perceptual process, includes information dealing with a substantial number of features regarding the perceived elements: colours, textures, sounds, smells, information related to the moment of the day, seasons, weather conditions etc. Sensation, on the other hand, offers unidimensional, elementary information, depicting a single aspect, simple features. Therefore, we could say that multiple sensations merge in order to form perceptions. [3].

In order to link the *concept of perception* to architectural theory, we have to extract certain aspects of the concept, which are adequate to our purpose. This point of view tends to differ, for example, from the artistic approach, which is more inclined to analyse just the way in which one *registers the composition* of the perceived scene. In its artistic interpretation, perception tends to deal just with colour, proportion, light and shadow; completely ignoring, for example, the quantitative aspects of the perceived data. This is a point of view, which clearly neglects the physiological process described above. Although accurate, this point of view is still incomplete. Thus, for a theoretical study of architecture, the conclusions that can be drawn from this analysis, regarding the *concept of perception*, must be filtered through the following sequence: creator of space → space → user of space. Meaning that the space created by architects will become reality, and then it will be perceived by a user. During the first stage of the perceptual process, s/he will register just its physical aspects. Then, during a second stage, the individual will be capable of distinguishing the three-dimensional space, while identifying and recognising its meaning, its function and / or utility - based upon past experiences, namely previously gathered and stored information. It must be emphasised the fact that each individual will perceive the space differently, according to their own

set of knowledge and experiences - which will differ from the one that the designer of the space possesses - a characteristic which should be thought of throughout the entire designing process. Thus, perceptions are very intimately linked to the cultural system to which the perceiver belongs to, as we shall see further on - always relating to more complex concepts such as crowding, the need of privacy, the ability of finding one's way, the need to mark one's territory, personalising space or deciding how to act upon the cues provided by the environment.

2. Theories on Perception

2.1 How Perceptions Are Being Formed

If we are to fully comprehend the way this process works - where it starts from, how it develops and what the final product is - we have to analyse how these perceptions are being formed. We shall discuss first the perceptual process itself and, then, we shall focus on relating the development of this process to the transformations involved in the action of maturation from childhood to adulthood.

Thus, the point is the basic unit with which visual perception operates. All the images that we record and which the retina transmits further on, are made of a myriad of points made visible by light. This is a process which takes place unconsciously, therefore the final product, what we 'see', is the image of what we perceive to be reality, and not an endless sequence of points (this aspect must be stressed because we will later understand that reality and the image that we perceive, are two rather different entities). The perceptual construct, as defined above, presupposes something else than the sum of its parts. This statement is actually the motto of Gestalt psychology. Their theory is based on the assumption that certain structures or features of the perceived image can be more important and different from the sum of its parts: '*We start with a flashing light. Then we introduce a second light flashing in the opposite rhythm, such that whenever one light is illuminated the other is extinguished. When looking at both lights, we see something different from the sum of what we saw from the two lights individually: We now perceive a single, non-flashing light moving back and forth between the two locations. (Seeing just one light with no flashing illustrates how the whole can be less than the sum of its parts.) Here, motion is an emergent feature, something categorically different and surprising because it is a property of neither light individually. The whole we perceive- the configuration or gestalt - differs from the sum of its parts.*' [3]
The perceptual construct acts upon four basic principles [4]:
1. *Grouping and Part-Whole Relationship* is the first principle. In order to obtain the image of an object, we must group the elements composing it, so that we are able to perceive it. This grouping process is done based on several criteria: *proximity* - we tend to group elements depending upon how close they are to each other, *similarity* - the more similar two elements are, the more probable for them to belong to the same object, *common circumstance* - if two elements transform in a similar way in time, we tend to group them together; *continuity* - contours and edges that combine tend to be perceived as a group; *closure and convexity* - closed curbs or curbs connecting into convex objects are susceptible of being seen as belonging to the same whole; *common regions* - any two elements contained within a single region, tend to be grouped together; *connectivity* - two physically connected elements, are often seen as part of the same object.
2. *Figure - Ground Segregation*, the second principle, determines the way in which we 'see' depth and understand the spatial hierarchy of objects: how much of what we see represents the opaque side of the first object and where does it begin, where does the second object start, hidden behind the first one. This same principle can also explain the way in which we distinguish the sides belonging to the figure from the background. This segregation is based on the following criteria: *convexity* - the convex part is usually the figure and not the ground; *size* - the smaller region is

most often the figure; *movement* - usually the moving element is the figure; *symmetry* - the symmetric region becomes the figure; *distance* - the closest object is usually perceived as the figure.

3. *Perceptual Association* refers to the way in which certain components of the stimuli's features or characteristics are physically grouped. An example of Emmert's Law clarifies this principle: *'Suppose we create an afterimage by staring at a bright square and then look at a nearby brick wall. We see the afterimage of that square on the wall, as though it were really there. If we now look at a more distant wall, we again see the square, but now it appears larger, in that it covers more bricks. If we look at our hand, the afterimage will appear to shrink to fit in our hand. Similarly, if we look at a wall that is oblique to our line of sight, the square afterimage becomes trapezoidal, demonstrating the perceptual coupling now between perceived shape and perceived orientation.'* [3].

4. *Multi-stability or Bistable Perception* is a principle which describes the effect produced when stimuli are correctly perceived with the same intensity in two different instances, sometimes the two images, or better said the two perceived interpretations, alternate spontaneously. [3, 4, 5]

But, above all these, the principle which governs all the others is the Law of Prägnanz, which states that we structure our percepts according to the simplest possible option. Maximum simplicity is reached when the minimum amount of elements is being used in order to sustain the structure of the whole.

This point of view should not be regarded as the single possible explanation of how the perceptual process works, but the Gestalt theory is the best articulated one, and, if there are other parallel or even divergent theories, at some point and somehow, they are all linked or based on this particular theory.

2.2 Structuring the Percept of Space

In order to be able to recognise, identify and attribute significance to objects, people or events surrounding us, we need to have a way of structuring the information that we receive from the environmental stimuli. Identifying the features and conditions of the environment, helps us navigate through it and provide adequate responses in different circumstances. The Gestaltist point of view asserts that the features, the relationships which we attribute to space, are not characteristic of *space* per se, but belong to *the objects* furnishing it [6]. Hypothetically, if we were to empty the space of all its objects, we would not be capable anymore of identifying, not even the most basic relationships of up-down, right-left, close-far because we would not have any reference objects against which to construct such judgements. Arnheim [6] argues that space exists only when it is being generated by the relationship between two objects. Architecture, urban planning, design in general do not just build space, but they create it: they cut out, enclose, border by compressing or decompressing space. In order to describe these tensions, which appear in the visual field, from a compositional point of view, the Gestaltists introduced the notion of *perceptual forces*, a term borrowed from physics [7]. Compressed or dilated space can thus be translated through perceptual forces of rejection or attraction: '*Chaos, order, variety or monotony result from the endless combination of these forces*' [7].

Kevin Lynch [8] underlines the importance of structuring and identifying spaces as processes necessary in navigating throughout the environment. In their absence, disorientation emerges, which causes, in its turn, anxiety and, in the end, fear. His theory is based on a bidirectional relationship between the individual and their environment: the environment provides cues which suggest certain relationships, structures, differences; while the individual selects with the help of attention, organises with the help of perception and attributes meaning to what s/he sees. This bidirectional relationship is interactive, and adapts constantly based on the data and information it receives from the environmental setting. Preoccupied especially with the urban image, Lynch identifies five types of elements which structure it. *The path* - is the route along which we usually,

occasionally or potentially move, while the other elements, to which it relates to, are being exhibited along it, physically it can present itself as a street, an alley, a channel or a railway track. *The edge* - is another linear element, but which cannot be categorised nor used as a path; edges are borders which define different areas, they are perceived as fractures: shores, walls or cuts made by railway tracks; their presence is not as obvious as the one of paths, but they are perceived as having an important role in organising the space, because they enclose homogeneous areas. *The district* - is a medium or large two-dimensional unit of the city and it defines an area with a certain character, which determines its identity. *The node* - is a strategic point, physically identifiable through junctions, nodal transportation stations, points, which can shift the structure or character of an area; they can become nuclei of certain districts; in such cases, they are the ones radiating the character of the place. *The landmark* - is an external reference which possesses the quality of being easily identifiable; it distinguishes itself from the background and expresses a direction; depending on the scale of the space, landmarks can be local - for example store windows, poles, trees -, at the scale of the city - towers, domes, hills -, or general - the sun.

Lynch's approach is oriented mostly to urban scale environments and it surpasses the perceptual level, plunging into that of *wayfinding*, namely extracting the main features of the environment and structuring them into an abstract form of representation, which becomes a sort of a built-in map that helps the individual orient themselves in space. Still, his theory is worth considering because, after all, before we are able to re-structure the environment in the abstract form of *mental representation*, we first have to understand and collect the main features of the environment, analyse and compare them to previously gathered data and decide what is important and worth remembering and what is not - or put briefly to construct *the syntax of the image*.

When discussing the structure of *the percept* of space, we are actually discussing an image, or a part of the environment surrounding us, a fraction of our reality. There is a fundamental difference between the image that we see and the mental representation we build afterwards. The mental representation, unlike the perceived image, is a product of our mind, *in the absence of direct stimuli action upon our senses*.[9] These representations are not random, independent images gathered in our memory. The information is actually decomposed in its elementary components: the atmosphere of a place, the size of a space, the colours, faces, objects, etc.; which are then placed in different parts of our memory. [10] Each time a certain task requires the presence of the remembered event, the information is recovered and recomposed as a *spatial representation*. These memories are highly subjective. First of all, even throughout the perceptual process, the image is not being perceived objectively. According to our interest towards a certain feature, particular areas can be registered more or less detailed. Then, the recovery process can reproduce an erroneous representation, based, for example, on data gathered from two separate events - if the source memory is deficient. [10].

As a conclusion, mental representations are lacking *syntax*; they do not possess an objective structure. Thus, they cannot *withheld the value of truth*. A physical image behaves like an object: it can be analysed, reanalysed; its features can be deconstructed into components, and we have the possibility of using a different classifying criterion every time. In the case of mental representations, the deconstruction can only occur once, when the information is processed and when it receives a certain place in the memory, after which any reconstruction depends upon this first processing operation. Mental representations, compared to physical images, are products, which possess a higher degree of abstraction, because they are based on information received through the senses, differing from what could be called a purely visual image.

Each of these steps - perceiving an image, constructing a mental representation, storing the information, reusing it - helps us establish a process, a way to interact with the environment surrounding us. The sum of these processes is what defines us as individuals, as groups, and,

ultimately, as cultures. The way in which we act or react to the environment, to any given situation, depends on our capacity to 'read' the cues provided by the environment, but mainly on the way in which we decipher the received message, on the way we understand (or not) the significance of what we see: '*It is not ordinarily possible even to get into a building unless one "recognises" that a wooden panel approximately 3 feet wide by 7 feet high with a knob at one edge and hinges at the other is a door (an object which one can open and pass through). Use of a 3- by 7-foot panel as the door is not automatic. It depends on meaning, which in turn depends on experience. Would an Eskimo or a South Sea Islander automatically understand its use?'* [11]. Coding, decoding and the way in which society expects us to react depends on the culture that shaped us. Knowing to give the appropriate answer in a certain situation is just like learning a language; knowing how to respond properly in different cultural contexts is just like speaking more languages. [12].

Understanding how this very complex process works is the key to better designs, to better and well-adjusted environments, which focus on the people, on their differences and common features.

2.3 Stages in the Development of Perception

In order to comprehend fully the way in which perception works, we also have to understand how it develops and evolves. The transformations through which every organism passes from birth to the state of adulthood, have been associated with four concepts [2]: *growth* - it is a more general term which does not refer to any specific kind of transformation and which can be associated with any type of evolution; *maturation* - a more specific term, which involves mainly a psychological growth; *learning* - refers to the *quantitative* change in the way in which information is received and stored, the individual changes as the result of accumulation of new percepts and corrects the manner in which s/he understands and reacts to the surrounding environment; *development* - implies *qualitative* changes in structuring the behaviour. Thus, the theories involved in the development of perception, study *qualitative changes*, which occur in the structure of the perceptual process. Jean Piaget, who conducted the most extensive study of this matter [13], distinguishes four stages in the development of spatial structuring:

1. *Sensorimotor Space* - up to the age of two years, the sensorimotor space develops simultaneously four concepts: *the genesis of the image* - self-explanatory. *The concept of object* - during the first year any object which leaves the child's visual field, is perceived as seizing to exist, but, gradually, the child understands that when he no longer sees an object, it is temporarily hidden, thus the concept of that certain object is cemented and it no longer depends strictly on visual or tactile stimuli. *The sensorimotor group of spatial displacements* - the child gradually shifts from perceiving spaces separately and from relating with them according to their needs or the body parts involved in the process, to a unique space in which different objects are interrelated, as part of a whole. Thus, the sensorimotor structures reach a level of independence, which allows the child to start internalising them as *thought patterns.*

2. *Intuitive or Pre-operational Space* - this period consist of two sub periods:
   2.1 from two to approximately seven years - *symbolic and pre conceptual thought*
   2.2 from four to seven, eight years - *intuitive thought*
   Pre-operational space is still being limited by the sensorimotor and perceptual activity. The preschool child is capable of returning to the origin of their movement in their thought, but only by traveling through a cyclical route and not a symmetrical one - which would be a quality of pure reversibility; the child's conception of space is still egocentric, meaning that it is closely related to their own point of view.

3. *The Concrete Operational Space* - comprises two categories:
   3.1 at about seven, eight years - *the emergence of concrete operations*
   3.2 from nine to eleven or twelve years - *organising operations into logical structures*
   During the early school years, spatial thought starts to break loose from the image and develops

into operations, although these are still concrete and depend upon the presence of objects. The child manages to liberate themselves of the egocentric organisation of space and is capable to relate to an exterior coordinate system during this period.

4. *Space of Formal Operations* - corresponds to adolescence, during this last phase of development of the spatial concept, the individual is capable of completely separating spatial operations from real space, objects or actions; abstract operations of mathematical nature allow the adolescent to survey an infinity of spatial relations in the realm of the possible and hypothetical.

3. Implications in Architectural Design - Case Studies

3.1 How to Read Cues from the Environment

Cloths, furnishings, buildings, gardens, streets, cities - all have a particular meaning about who we are, what we like, to which social group we belong to, towards what we aspire. However, today, in the current context in which different cultures collide, we must be able to operate among different coding systems. Operating in pluralistic contexts can be very difficult and confusing. Physical settings, just like cultures, have traditionally had the role of helping people to behave in a manner appropriate to the norms of their own group. A better understanding of this process should enable us to make greater use of this role that the environment possesses. Most often we are not even aware of this process of reading the cues provided by the environment, of understanding and decoding them. This is true particularly of traditional environments. An environment that belongs to a singular, very clearly defined culture can use much more subtle means of communicating with its dwellers. The rules of conduct - what is and what is not appropriate - are already known, so the physical form does not need to *induce* a behaviour, but rather just to *support it.* On the other hand, in the contemporary, multi-cultural context, the cues have to have a high redundancy rate in order to be perceived. They even have to be embedded into the environment in different ways, according to all the cultural systems using the same physical space.

This is why the information we require in order to establish the type of code which is used by a specific society, a certain culture, cannot be obtain based on interviews, but rather through direct observations upon the way in which users behave and the way in which they react and interact with the environment. In order to exemplify this principle, we are going to analyse two types of urban textures:

1. *The European Medieval Town* [14] - if we were to analyse the structure, the spatial pattern of the medieval European town, we could understand a lot about the way in which this particular space was being used. Many of its features were due to defensive reasons and this fact is quite apparent when 'reading' the plan. Density was very high because, even though the population was increasing, the area of the town remained the same because of its very tight perimeter imposed by the defensive structures. The town was organised around the church and the market place, thus stressing the important role which religion played, especially the church, in daily life. The market place had a similar importance because it was the place in which the most important events of the community took place. The street pattern had behind it the same defensive logic. Most streets were narrow and winding, thus restricting the number of invaders capable of passing through at once. At the same time, this pattern induced a feeling of confusion because you could never see and place the crossroads points along the way. The bends also provided convenient blind spots for the defenders to hide or plan surprise attacks. Thus, much of the behaviour can be explained through the physical form of the environment.

2. *The Traditional Arab Town* [15] - is divided into *mahalles*, enclosed districts, based on ethnical, religious or professional criteria. The Oriental urban texture is fundamentally different from the European one and this is a result of the dwelling customs and patterns, the way in which people live; their space reflects a different type of code, a different type of meaning. The most obvious fact is that the house in the Arab world is introverted, and not extroverted as the Occidental type.

The houses are organised around an interior garden, which becomes the oasis of family life. Everything else outside this unit can be considered residual space. The streets of the Arabic town seem to be what was left after enclosing all residential spaces. The house is very brutally defined from public space through almost entirely opaque walls. This fact underlines the introverted character of the house, but it also states another important feature, namely the lack of monumentality. The Arab house does not express the social status of its owners on the outside. Space, beyond the perimeter of the house, is structured hierarchically from semi-public space - blind alleys from which a limited number of houses are accessed - to the public space of the street. The tradition states that you should pass seven bends until you enter your house. If we were to compare this aspect with Miller's Law [16] of 7 ± 2 - according to which our capacity to store and operate with information is limited to dealing with 7 ± 2 elements - we have the necessary information to decode the strategic significance of this information: the attacker wouldn't be capable of remembering their way, s/he would be disoriented, maybe even experience anxiety, which would finally led to abandonment.

3.2 Designing without Psychology

The leap from the traditional environment to the modern world brought many changes with it. Behaviour, in traditional environments, is just as constant as the environment itself; they actually reinforce each other: the environment provides mnemonic cues about the expected behaviour, while a constant, routinized and habitual behaviour reinforces the need for a traditional environment. This type of behaviour is almost automatic, since the range of choices is greatly restricted in traditional cultures, thus the response tends to be more automatic, consistent and uniform. [12] Modernist architecture was seen as a rupture in this context, from a historical and a traditional point of view. It was a rupture which tried to erase everything and to restructure the world according to its own functionalist rules. The space of modernist architecture was fundamentally utilitarian, a feature, which did not coincide with the behaviour or what was expected traditionally from an architectural environment. Physical space was changing faster than the customs, the behaviour and the coding system used by the vast majority. In order to illustrate this gap, we will study two projects designed by Le Corbusier:

1. *Villa Bensus 'Ker-Ka-Ré' in Vaucresson, France* - was designed together with Pierre Jeaneret for George Bensus in a Parisian suburb, in 1923. It is Le Corbusier's first attempt to put into practice his purist ideas: he uses just surfaces - plain facades with ribbon windows, lines - a flag pole, two poles sustaining the canopy above the entrance and a plain handrail with horizontal bars on top of it, counterbalancing the volume of the bow-window; and points - a patterned surface to the right of the entrance. All of these formed a very different image from what people would call a home during those days: a plain cube with a flat roof and brutally cut windows. This image did not go well together with the context and the atmosphere of its neighbourhood. The building went through successive transformations. A pitched roof and a chimney were added, while both the front and the garden facades were altered beyond recognition. The front garden was replaced by a new addition which hosts commercial spaces. The garden facade received a new balcony on the top floor and the long, horizontal windows were modified in order to accommodate exits on this balcony, while the one on the ground floor was partly bricked up. This is a common example of the type of interventions which can occur when the environment does not correspond to the habitual behaviour of its users.

2. *'Quartiers Modernes Frugès' Assembly in Pessac, France* [12, 17] - the fifty one units assembly designed in 1924 at the request of Henri Frugès, a businessman with progressive ideas who wished to offer his workers state-of-the-art dwellings. He assigned Le Corbusier with this commission. '*This project allows us to see how Le Corbusier developed his composite principle of rational housing. Looking at his prototypes, we can see that when these composite principles are applied to housing design and production, they create both spatial variety and unity. [...] Basing his designs on an analogy between machinery and housing, Le Corbusier*

pioneered hyper-rational designs that continue to be very influential today, proving the feasibility of his concepts.' [17] The problems arose when these dwellings did not concur with the image of what their dwellers thought a house should look like. The long, horizontal windows did not match with the image of small windows with shutters from the rural landscape of France, so they had them replaced. Pitched roofs replaced the cold, rigid lines of the flat roofs. Other modernist details were also softened by interventions such as bricking up balconies, reshaping the window frames and adding window boxes.

It should be noted that none of these adjustments were made out of practical or functional reasons, they are simply decorative elements associated with a certain kind of meaning and, more importantly, with a certain type of *cultural system*. As these two examples show, if there is a contradiction between the physical form of the environment and the social and cultural pattern or system, there can be no connection between the dweller and the space s/he lives in. Thus, either the environment or the behaviour pattern must change.

4. Conclusions

Generally speaking designers tend to 'read' the environment in *perceptual terms* - they see the structure of the image, its composition, its elements; while the lay public, the users, see the environment in *associative terms* - what that particular information means for them. The question, which arises, is then for whom do we design? In order to create an adequate space, an environment, our design shouldn't just solve functional issues, but it should create an environment with a certain meaning, a meaning which should signify something for the one it is addressed to. The newly created space ought to include cues on how that particular space should be used, cues which should correspond to the specific coding system known by its users - more specifically it should be determined by the cultural system of its user. As a conclusion, we can assert that the environment has a system of interacting with its inhabitants, which we called an encoding-decoding system, and through which meaning is embedded into the environment and then, later, it is read by its users who thus know how to act or respond in that specific situation. Therefore, the physical form of the environment is very intimately linked to the culture (or subculture or even micro-culture) it serves. The space ought to speak the same language as the one who uses it and it should be our duty to understand and learn that language. The clearer the messages, the cues transmitted, the more probable it is that the space we designed is going to be used within normal parameters. Thus, we could avoid disorientation, confusion and anxiety provoking situations. It is important that we come to realise that the spaces we design are going to be used on a daily basis, for long periods of time, and that these spaces are going to play a mnemonic role - which is indeed the new spatial paradigm - reminding the users the way in which they should behave and use those spaces: *who is going to do what, when and with whom*.

5. References

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