

EXPERIENCING THE RELATIONSHIP BETWEEN ARCHITECTURAL SPACE AND THE MAJOR SPACE PHOBIAS

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Abstract. During the past decades there was a noticeable effervescence characterising the space-psychology related studies. These studies established a connection between *the characteristics of the environment and behaviour*. Thus, this paper would like to join this field of research. Consequently, the first issue raised is whether architecture is about a space *in itself*, or whether it is about perception, of a mental *representation*. A second issue is whether a space has qualities of *its own*, or whether its characteristics depend on the subjectivity of the perceptual process. This hypothesis generated an entire field of research, which disputes the differences between *space* and *place*. The last issue would be the role played by architecture in the context of the space-place-perception discussion. Thus, architecture finds itself in the middle of this debate, being the instrument which carves the environment we inhabit. In order to provide a practical answer to this last question, the paper bases its conclusions on the results obtained through an experiment. This experiment tested certain situations in which the natural adaptation process has been short-circuited. These are *phobic reactions*. Thus, the paper wishes to lay the first theoretical 'brick' at the foundation of an interdisciplinary research project between architecture, psychology, sociology and virtual reality.

Key words: space perception, virtual reality, space, place, spatial phobias.

1. Context

ArchDaily (ArchDaily, 2014a) states its mission to be as follows: "Our mission is to improve the quality of life of the next 3 billion people that will move into cities in the next 40 years, by providing inspiration, knowledge and tools to the architects who will have the challenge to design for them."

Thus, *ArchDaily* (ArchDaily, 2014a) points out, in a condensed but particularly trenchant manner, the social context in which architecture, as a discipline, finds or should find itself at this very moment.

Therefore, the "mission" of architecture lies in identifying which the characteristics of urban living are - as a reflection of the cultural, geographical, historical and/or sociological aspects defining the group whose background it becomes - and in generating spatial patterns as a reflexion or answer given to these specific characteristics. In other words, architecture is the one to (re)invent or (re)define the concept of *dwelling* according to the contemporary cultural, social and ideological transformations, mutations and collisions. In fact, seen from this point of

view, any theoretical or practical architectural endeavour has to keep an eye out for what will happen and how it could improve the life of the next 3 billion future (urban) dwellers on this planet, even if just on a small scale. This always-increasing number of urban dwellers raises more and more complex questions (Chapter 11) which reach beyond the common architectural procedure and project. At this time, there is a need for a paradigm shift, which should trigger, on one hand, new theoretical hypotheses, new methodological instruments, and, on the other, spatial patterns, intelligent architectural building types which correspond to the new *dwelling rituals* (Ioan, 1999). The questions that need to be answered by these new research fields – both theoretical and practical – are: how can we dissipate intelligent and top quality architecture? How can we create spaces which are able to become themselves the answer to certain contemporary social, cultural, ideological principles? How can we also measure and improve the quality of dwelling, and not just its architectural aesthetics?

Habitudes and the everyday should be seen as a resource, as the starting point, so that the research itself can realistically oscillate between a theoretical abstraction and the tangibility of the immediate reality. Therefore, this theoretical construct draws several conclusions at the end of its interdisciplinary pursuit – a path which tried to place itself at the crossroads of several disciplines such as theory of architecture, psychology, sociology and cultural theory.

2. Three issues to be raised

2.1. Architecture • Architectural Perception

The first conclusion, a rather elementary one, is that when one judges architecture, one actually speaks about *perceiving*

architecture and not about architecture *per se*. After describing and analysing the complexity of the perceptual process, it becomes quite obvious that, before an evaluation or even just a discussion of architectural aesthetic principles, the success or failure in architecture is a matter of *perception*. Such a discussion on perception, from an architectural point of view, is meaningful for several reasons.

One of these is simply the way in which one perceives the architectural object in front of them. Namely, what one *perceives* when, as a user, one tries to identify the manner in which a space should be navigated, the attitude one should have towards the physical environment, whether one identifies or not the meaning of the space (Chapters 4 and 5). It is an intimate, personal and immediate relationship with architecture – in which, of course, the aesthetic factor plays an important part –, but which depends mostly on one's knowledge, system of decoding and interpreting meanings, premonitions, preconceptions and rituals.

Another point of view, on a larger scale, is the way in which a community perceives space – be it an architectural object or an urban space. On this scale, not only that success or failure are more obvious, but they have a more profound impact upon the group, upon the community, as well. The balance is fragile at an urban scale and it can be easily thrown off: on one hand, one perceives the physical environment as a reflexion of the particular community it hosts, and, on the other, the changes or transformations, which occur upon the physical space, resonate with the social structure, behaviour, attitude and mentality of the community.

“We understand architecture as the outcome of larger urban dynamics, which

are therefore at the core of our research. By exploring a wide range of viewpoints – e.g. residents, architects, planners, developers and artists – we aim to provide some possible answers to the aforementioned questions. This will provide us with broad insights into how the relationships between design, politics, economics, culture and human behavior can literally and representatively (re)shape our built environment” (Failed Architecture, 2014).

Architecture is more than just a spatial or volumetric composition; architecture can *design spatial perceptions* and, at the same time, it can be judged as being a success or failure when the object - the product of architecture - is *perceived* in its context. In other words, we have reached a third point of view, namely this fragile relationship between *designing* and *dwelling* space, between *imagining* and *creating* space perception and *practicing* perception in the real, immediate space.

The complexity of the architectural theoretical analysis resides in following two-way relationship. Theory is, on one hand, critical - analysing and interrogating the physical reality, the immediate space or architectural product - and, on the other, it tries to come up with solutions - methodologies that are fundamental to the designing process in order to make a difference in the outcome of the final architectural product. Practically, one can trace theoretical endeavours, which are concerned as much with the creative process - that precedes the actual construction phase -, as they are with the effects produced by the implementation of the architectural object - the post occupancy phase.

Success or failure in architecture actually resides in the above-mentioned ways of perceiving space. The numerous examples

analysed throughout the thesis can be narrowed down to one simple equation: is there or is there not a perceptual correlation between the proposed object or space and the cultural, social, geographical, historical and/or ideological identity of the individual or the group for whom it was designed? Thus, projects like “Grande Hotel Beira” (Robert Cruiming, 2014; Grande Hotel The Movie 2014a, 2014b; Grande Hotel, 2010), “Centro Financiero Confinanzas” (Mead, 2013), “Ponte City Apartments” (Porada, 2013a) or “Vele di Scampia” (Van Iersel, 2011) failed (Chapter 9), while others, such as “Open House” (Porada, 2013b; Coleman Center for the Arts, 2014), “The Gjøvik Care Center” (ArchDaily, 2012; Rintala Eggertsson Architects, 2014) or the “Vinderhout” (Stramien Structuur & Architectuur, 2014) and “Meerhem” (Sint-Lucas Architectuur, 2014) cohabitation projects, succeeded (Chapters 5, 9, and 11).

2.2. Space and Place • A Perceptual Matter

A second conclusion drawn by the study is the fact that the basis of any theory concerned with space or place, with the transformation of space into a place, is, again, *a perception*. Be it a phenomenological attitude (Norberg-Schulz, 1980; Heidegger, 1982), Lefebvre’s (Lefebvre, 1991) twofold theory (Chapter 7) - subjective space versus objective space - or space seen as a process - as Massey (Massey, 1994, 1999) defines it (Chapter 7) -, all these arguments gathered in order to support or demolish a concept always start out as a unique way of *perceiving* space - namely the physical environment. The very definition of place, which oscillates between the very clear and definite boundary of *my space* - a space belonging to oneself - and the abstract concept of *heterotopia* - layering several places, several meanings into a single physical

space -, is a matter of perception. A space is homogenous and it also lacks structure if the individual *perceives* it as such; similarly, a space can become a place, when one gets to know it, by assimilating it - namely by *modifying their perception*.

If these matters are slightly diffuse or ambiguous on a theoretical level, the architectural examples presented throughout the second part, support this conclusion. The most eloquent example is the case of the Serpentine Gallery (Chapter 8) - each pavilion becoming (or not) a place. Every spatial exercise conducted on the gallery's lawn pictures a different type of spatial relationships, a different attitude towards the context and a distinct definition or materialisation of the concept of place. Nevertheless, the projects, designed over the last 14 years, can be simply interpreted as different perceptions of the space situated behind the gallery's building.

Actually, the entire collection of pavilions can be interpreted through this double-perception formula: one (spatial) aspect that the architect perceived as being the most important - also the starting point of the project - and, the other one, the perception proposed by inserting the architectural object in this space, thus succeeding to recreate or reorganise certain aspects or spatial relationships of the existing physical setting - the Serpentine Gallery lawn.

Temporary, light, mobile, inflatable, foldable or itinerant architecture are excellent examples of ways of testing and establishing this distinction, of testing the perceptual impact, which can be generated by the architectural object. Put simply, one is able to compare the before and after state, the changes caused by the object and the state after the object has been dismembered or disassembled.

Thus, in an assumed manner, the vast majority of the examples presented throughout the thesis are not architectural objects in the true sense of the word - most of the time, the discussed spaces, failed to become the basis of an actual function, of a specific activity -, but rather they were seen as spatial experiments, as different studies of ways of relating to space - on a physical, as well as on a conceptual level -, located somewhere on the boundary between art and architecture. These types of spatial experiments, lacking a clear cut function, offer a wider range of possibilities, an unrestrained flexibility which facilitate the search, the research on a theoretical level and on the practical level of design, as well. Thus the architect, the artist or the visitor have the possibility of trying out, of experimenting, of living different instances of spatial perception, of *an architectural perception*.

2.3. Phobia • A Perceptual Distortion

A third and last conclusion is concerned with the connection established between space perception, phobias - namely the spatial phobias, which are relevant to this particular study -, and their relationship with the architectural product. Extrapolating Hall's concentric circles (Hall, 1959, 1969), which enclose different levels of personal space (Chapter 6), to the level of the group or even to the level of the community, one could identify a similar succession of concentric intensity or quality spheres. When exploring the city, one can easily identify the spaces in which one is welcomed, perceiving that particular "homely" feeling - in situations in which one belongs to or interacts with a certain group - and the spaces in which one feels anxiety, in which one feels estranged, as being an intruder or simply as being excluded. From a perceptual point of view, these qualities are more or less perceptible,

according to our ability of deciphering the meanings of the space and also according to the familiarity with which we are used to interact with and within space.

Sometimes, in this context of concentric spaces, of different intensities, of individual perceptions, errors occur - errors regarding the reading or interpretation of the message, errors more or less motivated by evolutionary factors. Some of these are the three types of phobias approached in the thesis - *claustrophobia*, *acrophobia* and *agoraphobia*. In some situations, unjustified fear or anxiety are the result of erroneous perceptual processing. As a mechanism, phobias are triggered by certain characteristics, by particular events or distinct (spatial) relationships, which, usually, are not considered or perceived as being dangerous. However, certain individuals manifest an apparently inexplicable fear towards such circumstances. The structure responsible for triggering a phobia is rather complex and differs according to the type of phobia in question - *a born fear*, *a neutral fear* or *an acquired fear*.

From an architectural point of view, the existence of phobias raises certain issues. First, there is the question regarding the spontaneity of the onset of this uncontrollable fear. So far, it is virtually impossible to predict when, where, and in what context certain spatial characteristics will trigger phobic reactions in some individuals. The reason for this is the fact that phobias are actually a matter of perception, an intrinsic anomaly, unrelated to any physical spatial feature. Then, on the other hand, one cannot ignore the relatively large number of persons that experiment fear or anxiety differently. From an architectural point of view, one can still oscillate between certain parameters, so that one can ensure a certain

degree of comfort, not only *objectively*, for safety reasons, but also *subjectively*, for psychological reasons. So far, there are still only a handful of initiatives, projects or studies, researches in this field. The only examples of spatial experiments are the ones that are rather trying *to induce* a state of fear, of anxiety, in order to emphasise the impact that the space produces, in order to underline the message.

Thus, as far as architecture is concerned, there are two possible paths when discussing the topic of anxiety and architecture. The first - as proven by the research undertaken by Zeisel (Zeisel, 2006) (Chapter 10), in the case of "Hearthstone Alzheimer Care" - is to *alleviate* or *dissimulate* those spatial features that are prone to cause confusion, panic, and anxiety. On the other hand, there are also spatial experiments, which, on the contrary, try to test the limits of the comfortable, the boundary which defines a space as being still bearable - for example Studio FCJZ's "Vertical Glass House" (ArchDaily, 2014 b) spatial experiment or Szczesny's "Dom Kereta" (Rosenfield, 2012; Minner, 2011; Porada, 2013c; Keret House, 2014) (Chapter 11). This latter type of experiments fail to create a multipliable type of space, a spatiality which can host the everyday; they are rather concerned with generating strong sensations and emotions that test the alternative - a domain which is not motivated by an everyday activity, just for the sake of the experience, for the sake of generating *a perception*.

3. Towards New Methodological and Research Directions

The spatial experiments presented throughout this paper have a common feature, namely the desire to test the ideological boundaries of architecture, to question the space, the spatiality of the architectural object from different points

of view, that is to say an alternative, an interdisciplinary point of view which applies and (re)defines theories debating *the space* → *perception* → *individual relationship*. As a conclusion to these solitary exercises of operating with space, one can remark a certain interest exhibited by all authors towards discussions and ideas generated by a pluridisciplinary context. This context offers the advantage of giving a different kind of answer, which has a profounder social, cultural or individual impact - far more complex than gadget architecture.

Thus, these examples assert the need for new theoretical instruments, new methodologies which should be used as early as the documentation and design stages. As previously mentioned, most projects borrowed or adapted not only the information, but the manner of operating with it, as well - namely the methodological process specific to these domains, which are related to architecture. However, beyond the observations regarding the methods of manipulating space and the behaviour of the individuals, beyond the analysis of the information gathered through questionnaires preceding the designing phase and also following the occupancy process, the research methodology of space and the relationships with and within space, reach now a new level, through the use of virtual reality applications. Regardless which type of phobia is being discussed, the manifestation is relatively similar: a phobia is a strong, irrational fear, which persists. Its intensity evolves until it reaches a high peak. In order to avoid this peak, the individuals manifesting a high level of anxiety react by exhibiting a behaviour of avoidance, whenever they experiment the first signs of panic, fear or display an uncontrollable behaviour (Bruce and Regenbrecht, 2009).

Because of these aspects, diagnosing and studying phobias and other anxiety disorders in a virtual environment proves to be extremely efficient because of the possibility to expose the participants to stimuli, which generate anxiety. However, at the same time, the experimenter or the therapist can ensure the safety of the exposure and permanently adjust the parameters of the stimuli, as well (Botella *et al.*, 1999; El-Cordi *et al.*, 2013; Ibrahim *et al.*, 2007; Stefanucci and Proffitt, 2009; Clerkin *et al.*, 2009; Steinman and Teachman, 2011; Coelho *et al.*, 2009; Whitney *et al.*, 2005; Krijn *et al.* 2004; Coelho *et al.*, 2008).

One of the practical applications of the discussion regarding claustrophobia could be the correlation between *the most frequent size of a room* and *the degree of psychological comfort* it insures - especially in the case of individuals experiencing a high degree of anxiety towards narrow and enclosed spaces (Randomsky *et al.*, 2001). Thus, the proposed experiment investigates the possibility of a relationship between certain spatial characteristics - dimensions, ratio, the presence or absence of fenestration and the presence or absence of furniture - and *the state of fear*. The study took place in a virtual reality environment, thus testing these relationships and the viability of the procedure, as well. Put differently, this opportunity was used in order to develop a methodology which might be used further on in a wide range of studies regarding the relationships between different spatial characteristics and their impact upon the levels of comfort and anxiety.

From a legal point of view, in Romania there are three documents in effect that are relevant to this experiment: the Housing Law no. 114/1996 (Parliament of Romania, 1996), the Order Approving the Norms of Hygiene and Recommendations Regarding the Living Environment no. 536/1997

(Parliament of Romania, 1997) and the Regulations Regarding Housing Design (Building Design, Research and Software Institute - IPCT S.A., 2002). Thus, based on this information, the area of the most common room was identified as being of 12 m².

[From a legal point of view, it was rather difficult to identify whether the minimal area of a room is 10 m² or 12 m². The Housing Law of 1996 stipulates that the area of a bedroom for a one bedroom apartment is 12 m², while, at the same time, it specifies that, for a two bedroom apartment, the area of the bedrooms should be 22 m² - thus one of 12 m² and a second of 10 m². However, the Order Approving the Norms of Hygiene and Recommendations Regarding the Living Environment of 1997, stipulates that the area for the first bedroom should be of 12 m², and for two bedrooms of 24 m², even if the table is preceded by the following explanation: "The sanitary parameters which should be considered when designing and building dwellings are: - the minimal area of a room is 10 m²". Thus, taking into account all of these aspects, it was decided that the area used for this experiment should be of 12 m², the value which was used most often.]

Consequently, the experiment wished to study whether this area also takes into account the necessities of a psychological comfort - especially in the case of individuals exhibiting a raised level of anxiety towards small spaces - or whether this area should be further adjusted so that its proportions and/or characteristics would consider such variables, as well.

Therefore, the experiment itself should be considered as an individual study, based on the hypothesis that at least one of the three characteristics of a 12 m² room which were

studied - its ratio, the presence or absence of fenestration, and the presence or absence of furniture - can influence the level of psychological comfort exhibited in such a room. Accordingly, the endeavour focuses on the study of the perception of *the level of anxiety, comfort, and safety* in each case - the experiment being based on the assumption that a furnished, fenestrated, and square-shaped room will be perceived as being more friendly, thus registering a lower level of anxiety, than an unfurnished, un-fenestrated and a narrow-proportioned one.



Fig. 1. A participant preparing to enter the virtual reality environment of the Icube (EON Icube Emersive Environment - The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health, Babeş-Bolyai University, Cluj-Napoca, Romania)

The experiment (Fig. 1, 2, and 3) was based on a virtual, three-dimensional model, because - from both an architectural, as well as a psychological point of view - this choice presented more benefits than an *in vivo study*.

First, the participants were in a safe, controlled environment, inside the EON

Icube, whose parameters could be easily adjusted and studied. Then, if a participant might have reached a level of anxiety, which could have turned into panic, the use of virtual reality offered the possibility of pausing the experiment at any moment. Thus, the experimenter - and, up to a point, even the participant - had an almost complete control of all variables.



Fig. 2. A participant interacting with the virtual reality environment of the Icube (EON Icube Emersive Environment - The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health, Babeş-Bolyai University, Cluj-Napoca, Romania)

However, the most significant aspect of this experiment remains the fact that concrete results were registered, consequently emphasizing the existence of an interaction between certain characteristics of a 12 m² room and the variations of the level of *anxiety*, *comfort*, and *safety* (Fig. 4, 5, and 6).



Fig. 3. A participant interacting with the virtual reality environment of the Icube (EON Icube Emersive Environment - The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health, Babeş-Bolyai University, Cluj-Napoca, Romania)

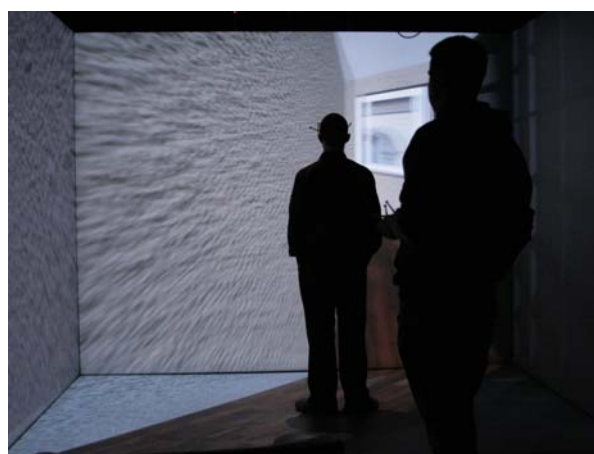


Fig. 4. A participant randomly experimenting one of the 8 model rooms (EON Icube Emersive Environment - The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health, Babeş-Bolyai University, Cluj-Napoca, Romania)

Thus, the first applicability of this result would be that the laws and regulations

regarding architectural design should take into account the legitimacy of *the impact of space upon the psychological comfort* of the user as a parameter in defining certain requirements regarding design.

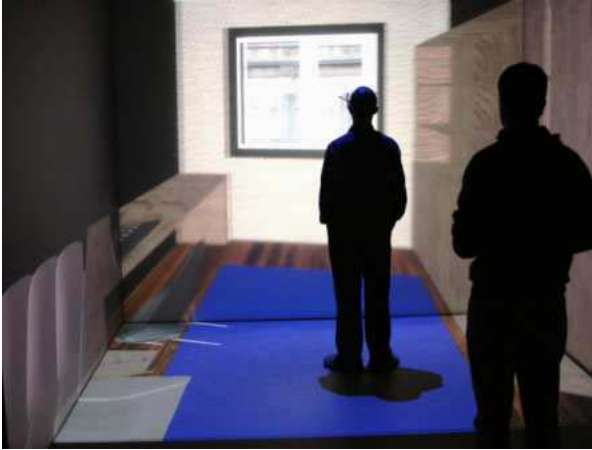


Fig. 5. A participant randomly experimenting one of the 8 model rooms (EON Icube Emersive Environment - The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health, Babeş-Bolyai University, Cluj-Napoca, Romania)

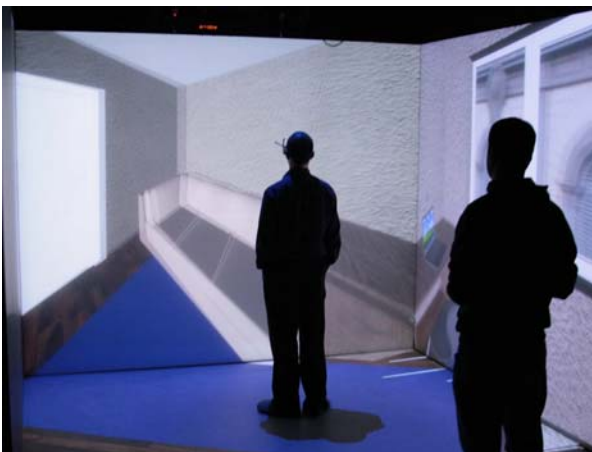


Fig. 6. A participant randomly experimenting one of the 8 model rooms (EON Icube Emersive Environment - The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health, Babeş-Bolyai University, Cluj-Napoca, Romania)

The present study is part of a series of theoretical exercises which focused on the manner in which psychological aspects can be influenced by varying certain parameters - for example the effect of colours upon the state and preferences

(Yildirim *et al.*, 2011; Park, 2009), the impact of lighting upon the perception of the dimensions of interior spaces (Berfeld and Hecht, 2011) or the psychological effects of a certain type of furniture (Stone *et al.*, 1990; Pizzatoa *et al.*, 2012).

As a conclusion, despite the limitations of this project, the main objective was reached. Besides its results - although they should not be overlooked - the experiment presented a manner in which the theoretical field of architecture can apply a research methodology specific to social sciences. Thus, it was proven that architecture - namely the theory of architecture - could diversify its field of research through interdisciplinary and transdisciplinary projects, which can produce significant information.

4. Conclusions

From a methodological point of view, virtual reality can offer a series of advantages. Firstly, one can test a virtually infinite number of parameters with minimal costs, thus taking advantage of the opportunity to optimise, with the highest degree of precision, the features of a designed space. Secondly, unlike the traditional 3D space modelling instruments, these new types of equipment offer the chance of a true *immersive* experience of the created model. This particular feature, as it was shown, can trigger states and emotional responses or generate behaviours, very similar to the ones manifested in real, physical environments. Therefore, virtual space has the ability to become a feasible working instrument for space psychology research. Such virtual platforms are already being successfully used in psychology in order to identify, analyse, and observe the triggering factors and mechanism of phobias (Chapter 12). Thus, widening this field of applicability, means just taking another step forward.

There are multiple research opportunities due to the existence and use of such a device. One could experiment aspects regarding the safety of buildings, namely adjusting certain parameters so that the traffic runs smoothly, so that the use of multi-storeyed buildings will not provoke accidents or so that different scenarios regarding the evacuation of the buildings, in case of fire, can be verified. Another series of applications is concerned with interior design. In this case, the possibilities are virtually endless, because an immersive environment can provide a higher degree of realism, as early as the conceptual level; thus, the feelings generated by real space can be better appreciated. This immersive environment can be used for urban design projects, as well - for example, in can be used to simulate different urban politics and strategies. Thus, specific scenarios of urban spatial evolution or transformation could be discussed, while documenting the impact generated by these modifications upon the user. A last possible research field could be the reconstitution or creation of virtual reality models depicting significant historical spaces and buildings. Besides an obvious educational purpose - i.e. virtually visiting such spaces - these research projects could uncover new aspects regarding the use and creation of space specific to certain historical periods.

Finally, yet importantly, in addition to the *quantitative* aspects of space production and reproduction in a virtual environment, the most important applicability of this virtual immersive environment remains the quantification of the *qualitative* features of space. Thus, the vast diversity of theories regarding space, spatiality, and the twofold space-place relationship, expressed over the last decades, can thus be transferred onto a

practical level. Such instruments offer the opportunity of testing, analysing, and interpreting the results obtained by adjusting a single parameter, so that the mechanism behind the drawn conclusions can be precisely linked to its generating cause. Establishing clear sequences of this process can generate, based on ample studies, amazing results regarding the quality of space and, most importantly, regarding the quality of the *user-space* relationship - both from a spatial and a psychological point of view.

Thus, the theoretical explorations undertaken by the doctoral thesis *Architecture, Perception, and Phobias - Experiencing the Relationship Between Architectural Space and the Major Space Phobias* (Pop, 2014) seem to have found a technical solution of how to apply a methodology which is eager to develop a niche of a very interesting field - *space psychology*. The study intended to analyse the manner in which the user-space relationship can be deconstructed into its basic components and, thus, it has uncovered that its core is made of a processing filter called *perception*, which exercises its influence both ways: onto the manner in which the individual responses to space as a result of the formed perception, as well as onto the way in which space is designed as the background of a culturally, socially, historically and/or geographically identifiable everyday. One extreme of this relationship - upon which the thesis focused on - is the situation in which, as the result of a perceptual error, phobias are triggered - i.e. *spatial phobias*. Consequently, this study intended to lay the first theoretical "brick" of an interdisciplinary research project, situated at the crossroads of architecture, psychology, sociology, and virtual reality.

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REFERENCES

- ArchDaily (2012), *Arboretum / Rintala Eggertsson Architects*, <http://www.archdaily.com/212963/arboretum-rintala-eggertsson-architects/>
- ArchDaily (2014a), *About*, <http://www.archdaily.com/about/>
- ArchDaily (2014b), *Vertical Glass House / Atelier FCJZ*, <http://www.archdaily.com/471261/vertical-glass-house-atelier-fcjz/>
- Berfeld D., Hecht H. (2011), *Fashion versus perception: the impact of surface lightness on the perceived dimensions of interior space*, *Human Factors: The Journal of the Human Factors and Ergonomics Society* **53(3)**: 284-298.
- Botella C., Villa H., Baños R., Perpiña C., García-Palacios A. (1999), *The Treatment of Claustrophobia with Virtual Reality: Changes in Other Phobic Behaviors Not Specifically Treated*, *CyberPsychology & Behavior* **2(2)**: 135-141.
- Bruce M., Regenbrecht H. (2009), *A Virtual Reality Claustrophobia Therapy System - Implementation and Test*, in: Steed A., Reiners D., Lindeman R. W. (Editors), *Virtual Reality 2009 - Proceedings*, the Institute of Electrical and Electronics Engineers, Inc., Danvers MA, pp. 179-182.
- Building Design, Research and Software Institute - IPCT S.A. (2002), *Regulations Regarding Housing Design [in Romanian] - NP 057/02*, Crescento, Bucharest.
- Clerkin E. M., Cody M. W., Stefanucci J. K., Proffitt D. R., Teachman B. A. (2009), *Imagery and fear influence height perception*, *Journal of Anxiety Disorders* **23(3)**: 381-386.
- Coelho C. M., Silva C. F., Santos J. A., Tichon J., Wallis G. (2008), *Contrasting the Effectiveness and Efficiency of Virtual Reality and Real Environments in the Treatment of Acrophobia*, *PsychNology Journal* **6(2)**: 203-216.
- Coelho C. M., Waters A. M., Hine T. J., Wallis G. (2009), *The use of virtual reality in acrophobia research and treatment*, *Journal of Anxiety Disorders* **23**: 563-574.
- Coleman Center for the Arts (2014), *Open House, Matthew Mazzotta*, <http://colemanarts.org/2013/06/open-house-matthew-mazzotta/>
- Cruiming R. (2014), *The Recycling of Grange Hotel [in Portuguese]*, <http://www.robertcruiming.nl/grandehotel/>
- El-Cordi A., Kästner A., Grube S., Klugmann M., Begemann M., Sperling S., Hammerschmidt K., Hammer C., Stepniak B., Patzig J., de Monasterio-Schrader P., Strenzke N., Flügge G., Werner H. B., Pawlak R., Nave K. A., Ehrenreich H. (2013), *A single gene defect causing claustrophobia*, *Translational Psychiatry* **3(4)**: e 254
- Failed Architecture (2014), *About*, <http://failedarchitecture.com/about/>
- Grande Hotel The Movie (2014a), *Synopsis*, <http://www.grandehotelthemovie.com/#/synopsis/synopsis%20grande%20hotel>
- Grande Hotel The Movie (2014b), *About*, <http://www.grandehotelthemovie.com/#/about/director's%20statement>
- Hall E. T. (1959), *The Silent Language*, Doubleday & Company, Inc., New York NY.
- Hall E. T. (1969), *The Hidden Dimension*, Anchor Books, New York NY.
- Heidegger M. (1982), *Poetically Man Dwells [in Romanian]*, in: Heidegger M., *The Origin of the Work of Art [in Romanian]*, Editura Univers, Bucharest.
- Ibrahim N., Balbed M. A. M., Yusof A. M., Salleh F. H. M., Singh J., Shahidan M. S. (2007), *Virtual Reality Approach in Treating Acrophobia: Simulating Height in Virtual Environment*, *International Journal of Mathematics and Computers in Simulation* **4(1)**: 381-387.
- Ioan A. (1999), *Khora*, Paideia, Bucharest.
- Keret House (2014), *Settle in Void*, <http://keret-house.com/filter/Arhitectura/Keret-House>
- Krijn M., Emmelkamp P. M. G., Biemond R., de Wilde de Ligny C., Schuemie M. J., van der Mast C. A. P. G. (2004), *Treatment of acrophobia in virtual reality: The role of immersion and presence*, *Behaviour Research and Therapy* **42**: 229-239.
- Lefebvre H. (1991), *The Production of Space*, Basil Blackwell Ltd., Oxford, Cambridge MA.
- Massey D. (1994), *Space, Place, and Gender*, University of Minnesota Press, Minneapolis MN.

- Massey D. (1999), *Spaces of Politics*, in: Massey D., Allen J., Sarre P. (Editors), *Human Geography Today*, Polity Press, Cambridge, pp. 279-294.
- Mead D. (2013), *Inside Caracas' Tower of David, the World's Tallest Slum*, <http://motherboard.vice.com/blog/inside-caracas-tower-of-david-the-worlds-tallest-slum>
- Minner K. (2011), *Keret House / Centrala*, <http://www.archdaily.com/152505/keret-house-centrala/>
- Norberg-Schulz C. (1980), *Genius Loci - Towards a Phenomenology of Architecture*, Rizzoli International Publication, New York NY.
- Park J. G. (2009), *Color perception in pediatric patient room design: healthy children vs. pediatric patients*, *HERD - Health Environments Research & Design Journal* **2(3)**: 6-28.
- Parliament of Romania (1996), *The Housing Law - no. 114/1996* [in Romanian], *Monitorul Oficial* **393**.
- Parliament of Romania (1997), *The Order Approving the Norms of Hygiene and Recommendations Regarding the Living Environment no. 536/1997* [in Romanian], *Monitorul Oficial* **140**.
- Pizzatoa G., Guimarães L., Damo A. (2012), *The perception of fear when using urban furniture*, *Work: A Journal of Prevention, Assessment and Rehabilitation* **41**: 266-271.
- Pop D. (2014), *Architecture, Perception, and Phobias - Experiencing the Relationship Between Architectural Space and the Major Space Phobias*, Doctoral Dissertation, University of Cluj-Napoca, Cluj-Napoca.
- Porada B. (2013a), *A Glimpse of Hope for Johannesburg's Forgotten Ponte Tower*, <http://www.archdaily.com/349033/a-glimpse-of-hope-for-johannesburgs-forgotten-ponte-tower/>
- Porada B. (2013b), *The 'Open House': From House to Theater in 90 Minutes*, <http://www.archdaily.com/418296/open-house-matthew-mazzotta/>
- Porada B. (2013c), *Jakub Szczesny's Keret House Open for Residence*, <http://www.archdaily.com/417993/jakub-szczesny-s-keret-house-open-for-residence/>
- Randomsky A. S., Rachman S., Thordarson D. S., McIsaac H. K., Teachman B. A. (2001), *The Claustrophobia Questionnaire*, *Journal of Anxiety Disorders* **15**: 287-297.
- Rintala Eggertsson Architects (2014), *Arboretum*, <http://www.rintage.com/projects/2011/arboretum/>
- Rosenfield K. (2012), *Inside The Keret House - the World's Skinniest House - by Jakub Szczesny*, <http://www.archdaily.com/289630/inside-the-keret-house-the-worlds-skinniest-house-by-jakub-szczesny/>
- Sint-Lucas Architectuur (2014), *Cohousing Meerhem* [in Dutch], <http://www.slide-share.net/sintlucas/woongroep-meerhem>
- Stefanucci J. K., Proffitt D. R. (2009), *The Roles of Altitude and Fear in the Perception of Height*, *Journal of Experimental Psychology: Human Perception and Performance* **35(2)**: 424-438.
- Steinman S. A., Teachman B. A. (2011), *Cognitive processing and acrophobia: Validating the Heights Interpretation Questionnaire*, *Journal of Anxiety Disorders* **25**: 896-902.
- Stone M. A., Stone P. H., Giffin K. S. (1990), *Psychology of office design*, *Texas Medicine Magazine* **86(1)**: 63-66.
- Stoops L. (Director), De Waele E. (2010), *Grande Hotel*, Serendipity Films, Ghent, Belgium.
- Stramien Structuur & Architectuur (2014), *Cohousing Vinderhout*, <http://www.stramien.be/projectdetails.aspx?ID=7de6839b-a147-4ab2-98d7-754092188ac1&HEAD=846f2621-1180-4fd5-8d29-9f58a92f1f03#Wonen%20&%20Wijken>
- Van Iersel M. (2011), *Le Vele di Scampia, Naples*, <http://failedarchitecture.com/le-vele-di-scampia-naples/>
- Whitney S. L., Jacob R. G., Sparto P. J., Olshansky E. F., Detweiler-Shostak G., Brown E. L., Furman J. M. (2005), *Acrophobia and Pathological Height Vertigo: Indications for Vestibular Physical Therapy?*, *Physical Therapy* **85(5)**: 443-458.
- Yildirim K., Hidayetoglu M. L., Capanoglu A. (2011), *Effects of interior colors on mood and preference: comparisons of two living rooms*, *Perceptual and Motor Skills* **112(2)**: 509-524.
- Zeisel J. (2006), *Inquiry by Design - Environment / Behavior / Neuroscience in Architecture, Interiors, Landscape, and Planning*, W.W. Norton & Company Inc, New York NY, London.

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