Notational tools

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Abstract. *Atmosphere refers to an impalpable condition having the capacity to influence the feelings of its users. Atmospheres can sometimes be recorded or surveyed. The problem concerning the idea of how to make an atmosphere is how to define a set of notational tools to permit its design. By considering a case study of the research Lab at the Non Linear Solutions Unit (NSU), part of the Graduate School of Architecture Planning and Preservation (GSAPP), Columbia University, this paper will analyze the different types of notational tools that permit the exploration of the relationship between spatial modulation and users' response. Initially, the paper will approach the idea of fragmentation of atmospheres in elementary units, such as attributes and blocks and then subsequently, analyze which tools permit the management of the interconnection of different parameters. By means of a series of case studies, the paper will assess the effectiveness of some notational tools and their capacity to transform the qualitative into the quantitative and the Non-Measurable into the Measurable.*

Keywords: combinatorial, attributes, parametric, performance, associative

The French idea of atmosphere refers to an impalpable condition having the capacity to influence the feelings of those who experience it. To make an atmosphere means to create an impalpable condition through the execution of a series of specific: spatial, geometrical, sound acoustic and climatic operations. It signifies the transformation of something that cannot be described, into a list of commands that will be executed by a manufacturer or contractor. To MAKE an atmosphere it is necessary to transform the idea of sensations into a list of operational directions. This operation signifies the transformation of the qualitative into the quantitative. The question remains: "What are the notational tools that permit the design of an atmosphere?"

Attributes and building blocks

The research Lab NSU at GSAPP at Columbia University, challenges the boundary between what is palpable and what is impalpable; between Measureable and Non-Measurable. The method formal modulation adopts the logic of a "creative reductionism" initially developed by the cognitive scientist John Holland[1]. According to the American scientist, "any human can, with the greatest of ease, parse an unfamiliar scene into familiar objects – trees, buildings, automobiles, other humans, specific animals, and so on."[2] To fragment a Non-Measurable entity into a set of numeric data and to identify the logic connecting them, means to transform what is non measurable into something that is measurable. It is a creative act unfolding new fields of the Measurable.

1. John H. Holland is a professor of Psychology and of Computer Science and Engineering at the University of Michigan; he is also an external professor and member of the Board of the Santa Fe Institute.
2. http://cscs.umich.edu/~crshalizi/reviews/holland-on-emergence

In architecture, this operation consists of decomposing a given reality into a set of elementary units (wall, windows, openings, fibres) and their attributes (thickness, length, rotation, scale, reflectivity, transparency, porosity, sound absorbance…) connected by a set of rules (rhythm, relative positions, geometry, proportion, alignments, relative size…) affecting the perception of space (light, sound, visual dynamics). The developed method consists of the "reduction" or modelisation of a given space through a list of attributes that can be manipulated and edited. In the most radical experimentations, design problems are deconstructed and represented exclusively by numerical data (length, size, depth, porosity, flexibility, colour saturation, frequency…). By identifying a set of properties or attributes that can be manipulated, NSU explores the relationship between representation tools and architectural design. The following paragraphs will present a series of case studies in which the modelisation of a design problem through a list of spatial attributes permits the definition of a design solution that affects the general atmosphere of the space.

Case study 1 Privacy Modulation – Toolbox office lab and co-working

Toolbox is a co-working space and professional incubator realized in Torino in 2010. The goal of the project was to achieve equilibrium between promoting user's interaction – enhancing the production of new ideas and collaborations – and to provide private individual spaces. The problem was how to measure and design different levels of privacy and interaction. How could an impalpable condition, such as the idea of privacy be codified in a set of editable data? The idea of privacy was connected to a series of variables (number of people, their relative distance, presence, height and width of visual or acoustic barriers, shading condition, etc.). Each component was designed and selected according to the relationship with their performance. The project was developed by adopting a series of notational tools permitting the creation of a direct connection between the spatial components and their performative effects.

Figure 1. Toolbox diagrams representing material performances in space

The idea of privacy modulation also appeared in the design of co-workers individual desks. The combined manipulation of a set of attributes facilitates the grading of privacy. In effect, the privacy/ sharing level of the desks could vary from a very private condition (with individual desks and tall screens) to collective condition (common tables without separating screens). The solution was achieved by combining some of the properties (attributes) of the two desks typologies. The result was a collection of desks with very short separation screens. The loss of privacy deriving from the reduction of the high screens was compensated for by an increase in the desk width, which augmented the relative distance between two users. This solution granted a sufficient level of privacy in an overall space that could be perceived as a collective environment.

Case study 2 Playfulness Modulation – Onion Pinch

The cork installation Onion Pinch developed for the biennale Experimenta Design Lisbon is an example in which the manipulation of material attributes defined a design concept that transformed a subway station into a childrens playground. During the design process, cork was analyzed as a list of physical properties and a set of attributes that could be manipulated almost like numerical data: texture, granularity, porosity, density, thickness, flexibility. The concept that emerged exploited cork's flexibility and it's response to pressure to create a playful space. By exploring the ideas of tactility and flexibility, the project was achieved by folding 15 strips of cork and literally pinching them with a bolt. Shape and profile transformations were obtained by moving the bolt, i.e., moving it towards the ground made the shape close down. The attribute, or position on the Z axis of the bolt, also affected the flexibility or level of vibration in response to pressure. If the bolt was in a lower position the form would be more rigid and by moving the bolt vertically the rings would become more flexible. Approaching the installation people slowed down from their everyday rhythm and looked at the installation, touched it, pushed it and tested the different reactions of the onion to body pressure. The displacement created by the presence of an extremely alive object, with its texture and with the oscillation of the onion rings, transformed an unfamiliar, cold space like the subway station into a lively oasis. Children entered the space and started to inhabit it.

Figure 3. Onion Pinch – The flexibility is controlled by varying the Z position of a hold

Photomontage as investigation tools

In the previous paragraphs it was possible to see how the manipulation of the attributes and physical properties of material or spaces, can be powerful tools in exploring the relationship between space modulation and the creation of an atmosphere. This approach can be very useful in understanding the performance of materials, space, lighting and geometry. Nevertheless, often the atmosphere of a given space (such as the lively atmosphere of a market or of a beach in the summer) is mostly dependent on the presence of human beings and on their actions and movements through spaces. How is it possible to envision the actions of people in a given space? Some examples of urban design in the 60s and 70s show urban spaces that were designed to be extremely lively, but that in reality are completely unanimated. The photomontages developed for the projects Social Cave and the Illy Shop, question which notational technique permits the visualization of the reaction of people to a specific space.

Presented as honorary guest on the occasion of the 50th anniversary of the Milan furniture fair, the Social Cave is an interactive installation exploring the boundary between physical and virtual socialization. The space is articulated in two corridors, each of which is provided with a kinetic camera and a projector. Inside the corridors, users could experience three

conditions: 1. approaching the wall they could see the people on the other side of the wall as a projection; 2. by augmenting the distance from the wall, they could see their own image mirrored; and 3. by looking through the installation aperture they could directly see the other visitors. The installation apertures created a continuous state of transition between physical and virtual socialization; between the inside and the outside of the installation. In order to define which kind of interaction we wanted to establish in the installation, the use of photomontages allowed us to verify the type of action that people might do in the space. The photomontages were developed by inserting human figures doing very specific actions. This method permitted the verification of the credibility of a given scene. The same technique was used as an investigative tool creating new types of situations and people's reactions. For example, using photomontage permitted us to observe that when the location of the apertures were in a lower position than that which would be considered as a “regular window”, visitors would bend slightly to see through the apertures. This unusual movement would augment others visitor’s curiosity. A similar simulation technique was adopted to design the external part of the cave. The goal was to design a space where people would feel comfortable to stay and to spend time. Photomontages allowed us to adapt the installation form in response to the type of atmosphere we wanted to achieve. The seating areas convex external form was achieved with the intent of creating a simultaneously exposed and protected area. The location of a series of energy plugs transformed the area into a very lively zone in which visitors would stop to sit, rest, work, walk, talk, etc.

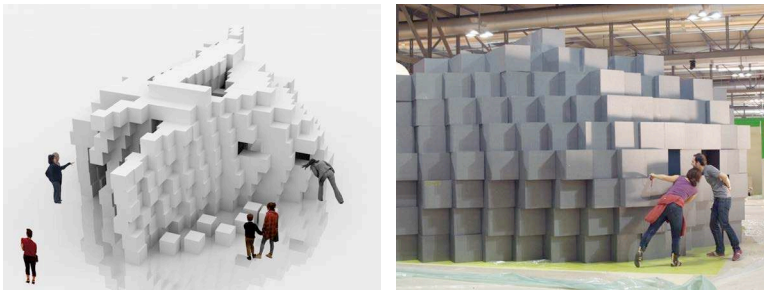

Figure 4. Social Cave photomontages and pictures of the final installation

Time based sequences

The previous paragraphs evaluated the impact of photomontage in the Social Cave and the concept of spaces in which atmosphere is strongly dependent on people’s behavior. Nevertheless they only define a limited moment in a “scene” and do not permit to understanding of an entire sequence. Time based plans and sections aid in understanding the relationship between time and the users’ experience. In the Social Cave, the design process started from a generic configuration. A precise time-based plan identifying the relationship between the different visitors while they were experiencing the installation was defined. The use of a parametric model permitted to define some constant relationships between the parts. The model allowed adaptation of the installation form to possible site variations. For example, one of project conditions was to, first, create a direct visual connection between the visitors before they entered the interactive space. Such visual connections were dependent on the presence or absence of foam blocks (defined with a 1 or 0 condition in the model) and were established by a trajectory (a line) connecting the eyes of two visitors. The parametric model permitted the removal of the correct block of foam in accordance with the slight variation that the installation could have during the construction process.

In the Social Cave project, the time-based design was very important to define and design the users' experience. The same method was adopted for the reconfiguration of the Illy Shop, designed by Caterina Tiazzoldi. The goal of the project was to define a multi-sensory retail unit that could overcome the flatness of virtual retailing. The project was developed with 200 different cubes whose length, depth and thickness would change, depending on the two paths of the customers: the fast and the slow one. The sequence was built by listing the type of interaction customer would develop with the space, product, smells, sound and visual materials. The maps were designed with a series of icons permitting the quick comprehension of which sense was affected in a specific area. In the design process, the shape of the different cubes would change in response to the performances required. Through modulating the four attributes: length, depth, thickness and openings, it was possible to obtain different atmospheres within a $30m^2$ space.

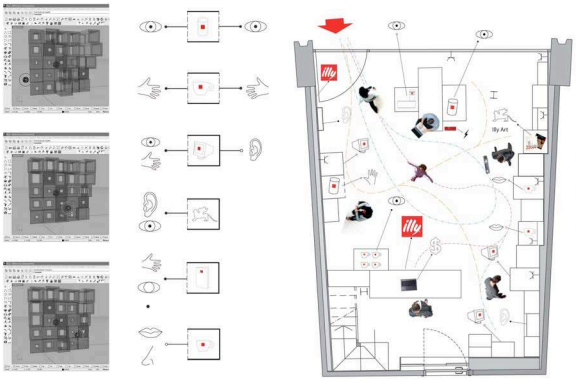

Figure 5.

The previous example has highlighted some notational tools developed within the context of the research lab NSU and in the context of Caterina Tiazzoldi's professional practice. Those notational tools are conceived to embed different types of information regarding the sensorial effect desired in a given space and to envision the possible interaction of people with the space. The paper approached the idea of a creative reductionism to facilitate a general design concept of a sequence of elementary units or attributes, which can be manipulated and then executed by a contractor or manufacturer. The second part of this essay approached the idea of notational tools to analyze how the different attributes are interconnected and how they affect people's behavior in space. It is important to note that these tools are not considered deterministic devices, which only develop a specific solution to a problem. In actuality, these tools should be viewed as heuristic devices, which permit exploration of a specific design concept. Notational tools can be considered as an associative device helping us to challenge the boundary between the fields of the measurable and the non-measurable in architecture.

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Caterina Tiazzoldi, is the principal of Nuova Ordentra, an interdisciplinary practice based in Turin and New York. She teaches at Columbia University, where she is directing the Research Lab NSU. She is also a Post Doctoral Fellow at DAED Politecnico di Torino. Finalist for the Renzo Piano Foundation Prize for Young Talents (2010), her research "is based on digital and physical manipulation of spatial attributes and material properties".