The subjects of urban regeneration, health, environmental suitability and social sustainability are strongly linked to each other and they represent a great challenge that cities around the world had to face in the latest years. The experience made in the field of transition towards environmental and social sustainability has brought out quite clearly the importance of local dimension. In fact, every sustainable solution is acceptable, if it is effective also at local level. The present book reflects a first step in the development of a study carried out by an international research team, composed by Italian, Greek, Romanian and British experts, aimed at creating a soft methodology for designing very simple healthcare facilities within city districts, which will enhance the sustainable character of the choices and focus on the social rather than on the therapeutic actions run within these peculiar spaces. Within this essay, the various authors' contributions concern the subjects of health, environmental space, architectural design and performance, interior design and medical equipment as well as the perception of environment.

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INDEX

Materials, architecture and multi-sensoriality

Sensitive spaces for care and health

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keywords
materials
architecture
multi-sensoriality
sensitive spaces
healthcare facilities

Introduction

The expressive values of light, and colors, interpenetrate in materials, becoming intensely structuring factors and since ever used in design processes contextually to formal choices to characterize the surfaces and spaces of architecture from a sensorial point of view and orient the perceptive experience. Where the contemporary culture seems to subtend a veil of elusiveness to the real data, connoting itself through a widespread tendency to dematerialization, in architecture this uncoupling from the corporeal, expressing itself by the study of infinitesimal thicknesses and the search for mutable and ambiguous material consistenciesto the usual perception, generates, in countertendency, a need for physicality that refound the value of architecture starting from the materials. The widespread instability of the material substance is reversed in an increasing interest in materials, aimed at enhancing their sensorial qualities within an enlarged perceptive dimension which, confirming the more usual and consolidated meanings of materials[1], reinvents further, innovative and unexpeted[2]. Once an objective idea of the perceived has become unreachable and the continuity of the traditional system of balances between material perception and its significance has been interrupted, this interest

in the language of materials is certainly understandable, "[…] as if there were no longer stable forms on which to settle the memory and on which to increase the thickness of the experience.

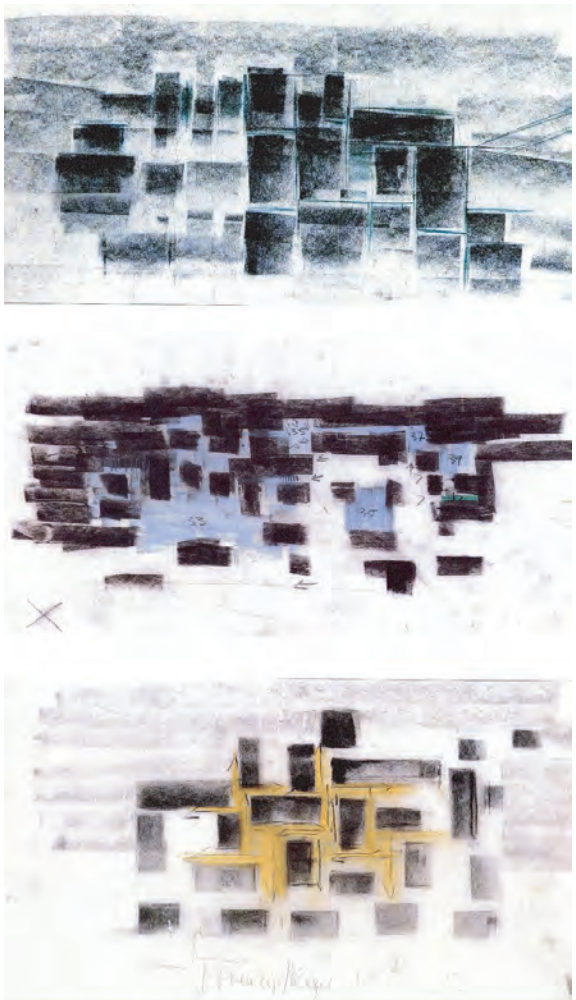

fig01 - Peter Zumthor, "Vals thermal baths", Valley of Vals, Grigioni, Switzerland, 1994-1996. Study sketches of the diagram.

Hence the discomfort and nostalgia of a lost reality are born for many and, for some, the search in the signs and materials of the past for those values of depth and substance that seem to vanish in the contemporary world"[3].
The construction materials, refounding their authenticity, free themselves from the stereotypical definition of inert entities and affirm their expressive and pervasive presence in architecture. How to re-establish an original source of architecture from matter, they bind to the genius loci more than the shape designed for buildings is able to do.
And, while the form[4], although not neglected, is almost always reduced to simplicity, the design work focuses on semiotic-perceptive studies, aimed at prefiguring the emotional experience of space based on the communicative and sensorial potentialities of the materials.

"Atmospheres" and spaces for health

The realisations of many great contemporary architects, especially in the field of public architecture, paradigmatically exemplify a search for multidimensionality as the founding value of spatial genesis that, in addition to perceptive transience, put materials at the center of the project as bearers of meanings, relations and multisensory experiential modalities. This general interest in the simultaneity of the various perceptive components is projected, demultiplied, within the architecture dedicated to health spaces.

fig02 - Peter Zumthor, Vals thermal baths, Valley of Vals, Grigioni, Switzerland, 1994-1996. View of one of the thermal baths.

If already in the first important modern realisations of hospitals carried out by masters of architecture - for example in the Sanatorium of Paimio, built in 1928 by Alvar Alto - the patient is placed at the center of the design and every technical solution is shown as a result of profound psychological evaluations, currently the traditional nosocomial image is almost completely disappearing. Progressively, networks of social and health structures are replaced it, designed at the same time to reassure, through the a renewed concept of health, understood not so much as the absence of illness, but as research of well-being and respect for the emotional condition of people, (patients, doctors or health professionals) who spend a lot of time there for treatment or for work. The same concept of 'environmental quality' has updated its meaning in this sense, shifting the focus from the physical aspects of the health/safety binomial, whose parameters are shape, size, pollution levels (chemical, acoustic, electromagnetic), to a

perceptive-emotional conception oriented to the enhancement of the sensory aspects in the well-being/health binomial[5]. Re-evaluating the synergic action of all five senses, the design criteria adopted for the creation of new and sensitive spaces for health call into question, in addition to the usual and dominant visual perception[6], also the other sensitivities (tactile, haptic, sonorous, olfactory) and perceptive modalities (proprioception, kinesthesia, synesthesia), paying attention to "an original layer of feeling that precedes the division of the senses"[7], where each "object immediately speaks to all the senses [...] and it is difficult to limit the experience to a single sensorial register"[8]. Whether they are structures of a strictly clinical type or health and wellness centers or simply hospitality or rehabilitative structures dedicated to health, the quality of these traditionally confined spaces does not appear to be entrusted solely to the solution of functional problems, but is extended to the profound meaning that the luminous, material, chromatic and sequential characteristics of the spaces produce on our multisensory system, causing discomfort or comfort.

In this regard, the refined wisdom of the architect Peter Zumthor, openly interested in creating spaces that offer man a quiet landing and, at the same time, pleasant sensations from the first impact, introduces the word 'atmosphere': a condensation of functionality, comfort, solidity and beauty realized for example in the thermal building in Vals[9].

"We wanted to make people 'wander freely', we wanted to produce an atmosphere in which the visitor felt more seduced than guided. The corridors of the hospitals are spaces that guide us, but there is also a way to seduce, to induce oneself to let go, to move freely [...]"[10]. Made of local stone - Vals gneiss, a gray quartzite veined with green reflections that combined with water and sunlight creates multiple effects during the day - the thermal complex as a whole evokes a large porous rock that seems to be generated by an intrinsic energy emanating from the context and capable of transmitting the meanings of the work from the preparatory drawings of the project.

In the study sketches of the diagram, in particular, we read, already enclosed, this poetic relationship with the materials and the nature of the place that the architect was able to recognize and revealed, working "[...] with light and darkness, with the mirroring qualities of the thermal bath or the dense opacity of the air saturated with steam, with the different sounds that water produces in contact with the stone, with the most intimate sensations felt by the naked body in the bath rituals"[11] and realizing a vibrant space that involves, like music, completely those who cross it.

As in this 'sculpted atmosphere' created in the valley of Vals, various other important projects have marked in their integrated approach of a material and holistic/multisensory type the reference for the architecture of spaces for

fig03 - Herzog & de Meuron, Children's Hospital Zurich, Lengg, Zurich, Switzerland, 2012-2018. View of the body intended as a research center.

health, with constant and dynamic references to the elements of nature (light, green …) and the goal of detaching from the stereotypical conception of sanitary spaces. For example, the Children's Hospital in Zurich[12] by Herzog & de Meuron which, to recall the rural context of the Lengg district in which it is located, uses wood as the predominant material, arranging the two large blocks (pediatric hospital and research center) on horizontally extended forms, to ease interrelations and functional interdependencies and allow patients to integrate into the care setting in an immersive experience, facilitated by the presence of natural light inside and numerous trees in the courtyards and exterior of buildings.

Still within the pediatric hospitals is the "Pietro Barilla" Hospital in Parma, built by the Policreo and OBR group in 2013.

In addition to pursuing functional objectives and environmental sustainability - the facades, for example, are designed to allow natural ventilation that improves the conditioning of the interior spaces with consistent energy savings - the hospital is designed on the basis of studies on child psychology and based on a strong multi-sensory relationship with the neighboring landscape, useful for stimulating

fig04 - Herzog & de Meuron, Children's Hospital Zurich, Lengg, Zurich, Switzerland, 2012-2018. View of the body destined to the pediatric hospital.

the patients' visual perception and demonstrating how multisensoriality can influence the disease treatment. The building is covered with colored glass that, by varying the permeability in the light of the spaces dedicated to care, produce simultaneous reflections of the context - also characterized by the presence of large trees - and induce the body and psyche of small patients towards a perceptive dimension empathic, able to rediscover their natural balance according to the principles of chromotherapy. Something analogous can be found in Le Corbusier's project for the Hospital in Venice[13], where the great architect, anticipating the criteria of sensitive design, had conceived electrically colored and inclinable metal plates able to dynamically filter the intensity of sunlight.

Sensory synergies

An accentuation of the enlarged dimension of perceiving which underlines the effects of simultaneous and combined exercise of various senses is more clearly found in the manifestations of synaesthesia, the perceptive phenomenon that associates, and identifies at the limit, percepts corresponding to the same stimulus or input, but warned by different senses[14].

A well-known example of synaesthetic sensitivity is given by the sense of smell, of which it is easy to experience the ability to recall visual memories, through the formulation of images and the creation of spatial maps[15].

It is known that the odorous notes of natural origin can influence the moods and behavior of individual people, and it is evident - especially in spaces of care that should always be healthy and clean - the importance of feeling in an olfactory pleasant environment. Not everyone probably knows the beneficial effects on health of some olfactory stimulations[16], especially if associated with other sensory sources of different nature: it is the principle that inspires the so-called multisensory rooms. This particular host dimension, studied for patients suffering from particular traumas or cognitive pathologies, is able to reactivate the compromised central brain processes, leading the patient into a particular totalizing experience based on the combination of simultaneous perceptive stimulations.

The multi-sensory rooms, of Dutch origin, are also called “snoezelen spaces” because they combine exploratory activity (snuffelen) with relaxation (doezelen) and are mainly dedicated to children, the elderly or the disabled. In Italy they are in different care facilities[17]; they consist in the creation of luminous and sound color fields on the walls, obtained also due to small movements made by the patients. Their immersive condition, augmented by correlated sound stimuli, is based on the extension of movement to the visual space and cannot be discretized, since its value does not correspond to the sum of the individual perceptive components.

The same principle of globality and inseparability of the contributions of the various senses to the total perception of space and objects can be found in the field of tactile and haptic sensibility[18]: where there is a system of receptors particularly suitable for perceiving the surface and material characteristics of the objects (roughness, hardness, temperature, weight, overall shape and volume, exact shape), applying the respective various exploratory procedures[19] (lateral movement, pressure, static contact, support, containment, follow the contour), it is not immediate to discern the specific contributions of each component.

Analogously, it is difficult to extract or ‘distil’ within a distinct mode of sense, for example the sense of smell[20], of specific components, separating them from the global perception,

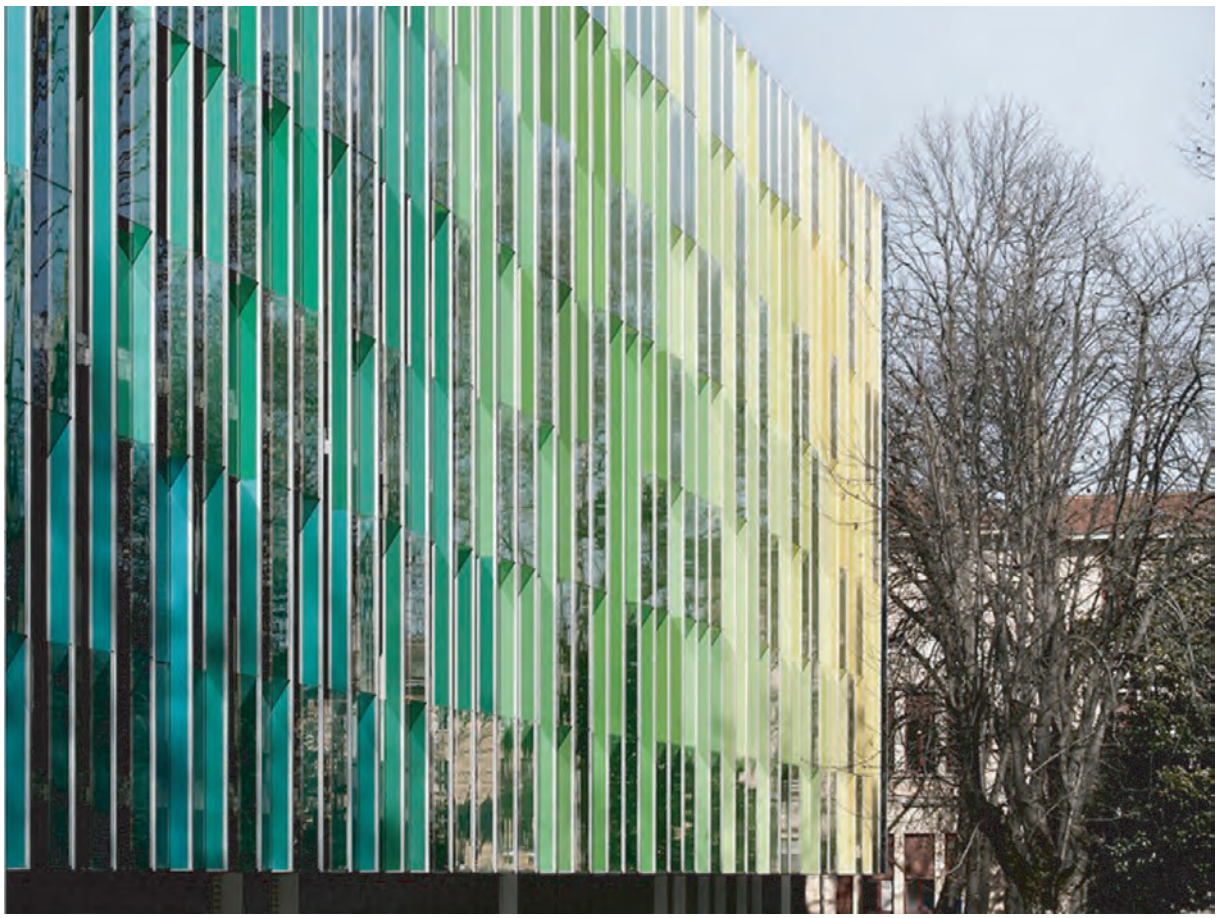

fig05 - Policreo and OBR, 'Pietro Barilla' Hospital, Parma, Italy 2013. View from the outside of one the sensitive facades.

to repeat them or transfer them … as happened to the protagonist of the Süskind novel who uselessly "tried to distil the smell of glass, fresh and clayish smell of smooth glass, […]. He procured glass from windows and glass from bottles, and treated it in large pieces, in splinters in fragments, in the form of dust … without the slightest result. He distilled the brass, porcelain and leather, grains and pebbles. He distilled the pure soil. […] With the help of the still, he believed he could extract their characteristic aroma from these substances, as could be done with thyme, lavender and cumin seeds. But he did not know that distillation is nothing but a process of separation of the mixed substances in their individual components […]"[21].

fig06 - Policreo and OBR, 'Pietro Barilla' Hospital, Parma, Italy 2013. Detail of the facade with the interpenetration of the effects of reflection and transparency combined with the use of the principles of chromotherapy.

Conclusion

In order to find a common denominator, it would certainly be difficult to identify the olfactory characteristics that each of us associates with spaces and objects, creating ideal personal mappings capable of recalling images and remote memories related to well-being and health.
But, although the olfactory dimension have currently retrieved an increasingly rich and significant cultural content - as if, with the establishment of a progressive order of artificiality, we realized the need to maintain a primordial relationship with things - few are so far the realisations of architecture and spaces for health that have been designed by integrating the olfactory properties of the materials (for example the perfume emanating from the wood essences) in the atmosphere created for these places of life and care in order to characterize them emotionally for the well-being of the people.

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Notes

1 - The common imagination has established archetypal ideas for each material (the stone of the masonry, the wood of the furniture ...) determining its recognisability, the sense of the denominations, the cultural and symbolic meaning (the stone refers to the resistance and duration, the wood to the passing

of time ...) and affirming the specific language.

2 - To have only examples of innovative materials, consider that today it can be considered a transparent material not only steel (when it appears as perforated sheet, striped sheet, grids, nets, meshes, fabrics), once impenetrable, but also the same cement, when it appears as LiTraCon (Light Transmitting Concrete), a diaphanous cement conglomerate that combines the characteristics of solidity and heaviness typical of artificial stone with the condition of translucency and permeability to light, typical of glass. It is no longer immediate, in fact, as it was in the past, to distinguish between traditional and innovative materials or between natural and artificial materials, since the materials and their surfaces, between design inventions and new technologies, produce confusing ambiguity and seduction for our senses.

3 - MANZINI E., p. 79.

4 - MERLEAU-PONTY, p. 308.

5 - About it Peter Zumthor explicitly states in an interview: "In each of my works the material dictated its laws. [...] The projects come from an idea and this idea, in my case, is always accompanied by a material. I don't conceive a way of designing in which the form is decided first and then the materials".

6 - If the environment is intended as a landscape, in the need to interpret it according to the meanings of visual landscape, soundscape, smellscape, we can read a confirmation of the attention towards the multiplicity of the perceptive dimension by contemporary culture.

7 - In the Illuminist era, the sensorial conception of nature was set aside by rationalism, entailing the tendency to dominate the view over the other senses: unlike, for example, touch or taste, it is the most distant meaning from the source of the stimulus thus allowing greater reworking interpretative of the percept and therefore less immersivity.

8 - MERLEAU-PONTY, p. 306.

9 - Ibidem.

10 - Vals Thermal Baths, are realised in the Valley of Vals, Grigioni, Switzerland, between 1994 and 1996 and they are one of the most important and well-known works of the Swiss architect.

11 - ZUMTHOR, p. 43.

12 - ACOCELLA, p. 423.

13 - The design of the Children's Hospital and Research Center in Zurich by Herzog & de Meuron was launched in 2012, while the construction was completed in 2018.

14 - Declaredly conceived by solving the lighting of the wards in consideration of the effects that polychromy has on the healing of the sick, the unrealized project by Le Corbusier for the Venice Hospital was drawn up between 1962 and 1968.

15 - "[...] through the senses the lucidity of gold presents us with its homogeneous composition, whereas the dull color of the wood presents its heterogeneous composition. The senses communicate between them by opening up to the structure of the thing. One sees the stiffness and fragility of glass, and when it breaks with a crystalline sound, this sound is vibrated by the visible glass. You can see the elasticity of the steel, the ductility of the hot steel, the hardness of the blade of a plane, the softness of the shavings". MERLEAU-PONTY, p. 308.

16 - In some US hospitals (eg at Beth Israel in Boston) not

by chance, they are used diffusors of particular fragrances and even smells of some family foods use to stimulate the mental activity of the patients by pleasant and domestic memories.

17 - For example, stress reduction effects can be achieved, personal identity strengthened, and situations that are fundamental for the patients' mental and physical balance are recreated.

18 - In Italy snoezelen rooms are located, among others, in the Hospital of the City of Parma, in the Emergency Room of the 'Careggi' Hospital in Florence, at the Sacra Famiglia Foundation in Coquio Trevisago(Varese), in the Geriatrics Department of the New Hospital Saint Agostino at Estense of Baggiovara (Modena).

19 - Haptic perception is the mode of recognition of objects, of their shape, material consistency and weight, through the exercise of the sense of touch.

20 - The various tactile exploratory procedures were studied by Lederman and Klatzky and theorized in 1987.

21 - It is interesting to note that the sense of smell, or olfaction, is the most innate sense in man because it guides him even before birth.

22 - SÜSKIND, p. 25.

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