Humanization and Architecture
in Contemporary Hospital Building

Giuseppe Pellitteri and Flavia Belvedere
University of Palermo, Italy

ABSTRACT:

Architecture and health are closely dependent. Architecture more positively influences human health as appropriating to its needs. However, humanization of hospital spaces wasn't always evident. Since the end of Second World War, in fact, the hospitals are good buildings if they meet only the technological and functional requirements.

Dealing with humanization and its architectural quality means to focus the human needs and understand their interaction with the environment. In these terms, it is not easy to define the architectural quality, because it is based on principles, which in turn are not quantifiable. Although, there are several studies from different disciplines which allow choices in terms of "added value that can be achieved".

In this paper, we propose the results of a research about this issue. Focusing on the psychological need of man, treasuring contributions of these disciplines (particularly about environmental psychology, expressive arts, Ergonomics, Evidence-based Design, the art of gardening, the studies on the perception of shape and color) and analyzing the functional and formal features of contemporary hospital, we developed a system evaluating architectural design choices, and a methodology defining guidelines to direct the choices aimed at the humanization of hospital space.

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INTRODUCTION

Many scientific patient-centered researches have shown, as the psychological distress which inevitably follows the sickness can be contrasted with an environment able to support patients' psychological needs (Ulrich 1991, McKahan 1993, Lemprecht 1996). Patient psychological well-being depends on many factors, such as, for example, light, exterior views, art, accessibility to gardens, etc. The architectural design has to take into account these considerations in order to build an environment where the patient will be able to live without anxiety.

In the years immediately following the Second World War the hospital construction has answered, essentially, only to functional and technological requirements. It was an efficient *machine à guèrir* (Foucault 1979), "the perfect architectural expression in the age of high-tech medicine" (Verdeber 2000,13).

In the late 50s, the Modernist counter-culture, as reaction to this point of view and under the influence of the studies of the psychologist Abraham Maslow (1968) on *Hierarchy of Needs*, begins to talk about humanization regarding the care, the healthcare institutions and the user needs. Since then many initiatives, including for example the "Hospice movement" (1967), have developed their activity on the issue of the humanization of healthcare. In the last twenty years, the hospital humanization has focused also on architectural and design aspects. Nowadays to guide the designers' choices in such sense, there are only just indications with general and approximate character. The main problem in order to formulate a system of guidelines is due to the same nature of the concept of humanization, based on the psychological well-being, often not quantifiable. In fact, different disciplines: Environmental Psychology, Architectural Psychology, Neuroscience, Immunoneuropsychology, Ergonomics, Evidence-based Design, Theories about Perception, contribute to define the concept of humanization and then contribute to the definition of the quality of contemporary hospitals, that is related also to the humanization of hospital spaces and therefore to the quality of contemporary hospital buildings. Each of these disciplines aims at achieving the architectural quality and improving

users' well-being, because the beneficial effects derived from their application but are not easily quantifiable.

The work presented is part of a more general research, *Hospital space: design guidelines and trends*, whose purposes are: 1) the comprehension of the formal identity of contemporary hospitals and the expectation about their possible future development; 2) the definition of an assessment methodology of architectural design choices, and 3) the development of a system of guidelines able to direct the project from the point of view of the humanization of spaces supporting the healthcare activity.

Omitting the first part, the other points were already carried out in a previous work, (Pellitteri, Belvedere 2010) of which this is a further consistent development.

1. METHODOLOGY OF ANALYSIS AND ASSESSMENT OF THE CHARACTERIZING SPACES FOR THE HUMANIZATION

The spaces serving hospital not only communicate and represent their health content, but they also provide stimuli affecting the user psychological well-being, satisfying his needs of humanization. These spaces are: entrance hall, corridors, rest and waiting areas, patient rooms and day rooms. In these areas often more representative and characterizing than others of the architectural quality of building, users can "save/affirm the identity of their own personal and social existence" (Spinelli et al. 1994). The methodology assessing the quality of architectural space in terms of humanization, derives from the study of the environmental system (UNI 10838:1999, Italian standard) based on its needs, requirements and performances. Respectively about these we deal mainly with:

- Need: What it is required for the correct carrying out of user activity;
- Requirement: Identification of factors and conditions that can satisfy the need;
- Performance: Behavior of the space considered.

The requirements, that we have considered, are the psychological ones.

The main activities performed have been identified for each characterizing area for humanization. The main psychological needs of patient based on the Hierarchy of users needs (Jordan 1998), are: Recognition, Acceptability, Usability, Territoriality and Amenity (Table 1).

Herein there are indicated some performances (Table 2) referred only to the **entrance hall** (of course, in theresearch, all the performances were defined related to each space). Among all the mentioned areas, the entrancehall is the most important for the humanization. It is not only a simple instrument to enter into the hospital building, itis not a static barrier, it is a dynamic threshold between the interior and exterior space, "making gradual and not brusque the detachment from the everyday existential dimension" (Pellitteri 2008).

NEED	REQUIREMENT	DEFINITION
Recognition	Visibility	Ability to detect and identify an area on basis of physical and context characteristics.
	Representativeness	Ability to communicate the function in an unequivocal way.
	Spatiality	Own qualities (shape, distribution and physical disposition of the environments) of the built environment.
Acceptability	Comfort	Environment ability to convey a sense of well-being, eliminating or reducing the unpleasant o inconvenience sensations.
	Variety	Presence inside an environment of multiple and different elements.
Usability	Continuity	Ability to maintain the relationships that link together two separate and distinct pieces/areas of the building and of these between them.
	Orientation	Ability to transmit information that activates cognitive functions. It can be *guided* and *spontaneous*.
Territoriality	Privacy	Ability of a space to protect the personal and private sphere.
	Socialization	Ability of a space to improve interpersonal communication.
	Familiarization	Ability of a space to have features more similar to house/urban appearance.
Amenity	Sensory	Ability of an environment to stimulate the sensory perception.
	Unity	Expression of the formal and functional relations of each part of the building and of them together.

Table 1: Requirements corresponding to such classes of needs with the related definitions.

REQUIREMENT	PERFORMANCE
Comfort	**Presence of exterior views** According to Psychology, it meets the needs of man establishing continuity with a point located outside of themselves and of his sickness.
Sensory	**Prevalence and chromatic agreement** It has been demonstrated by Immunoneuropsychology studies (Gappell 1992, Solomon 1996) that the color, beyond being an important communication element, full of expressive and symbolic contents, affects also emotions and human physiology: red stimulates the sympathetic nervous system and the brain wave activity, and accelerates heart rate, increases blood pressure and respiration; blue triggers the parasympathetic nervous system, and is credited with a tranquilizing effect. Color, according to the Gestalt Theory, influences the perception: the warm colors (red, orange, yellow) seem moving forward, cold ones (green, blue and purple) appear receding. The use of cold colors make lighter and smaller objects, while the rooms seem bigger, etc.
Spatiality	**Shape** "Theory of good form" (Gestalt Theory) says that the structure more easily recognizable is the simplest one, that in which the obviousness of the intended use is associated with clarity and essentiality of the volume and the spatial distribution.
Privacy	**Distance among sittings** The same distances, indicating the intimate, personal and social relationships between people, (Theory of Proxemics, Edward T. Hall 1963) are used to indicate the right distance among sittings.

Table 2: Some performances related to the entrance hall.

Needs, requirements and performances, specified for each area, are inserted into a form (Fig. 1 and Fig. 2). For each spatial unit, the needs, requirements and performance with the related conditions for their implementation are inserted into a report. An assessment parameter is assigned to each condition of implementation of the performances, that expresses the presence/absence of the environmental requirements requested, that is the perfect matching of the requirements for implementation to the requirement (value equal to one) or, if the value is null, the opposite. It is also an intermediate value, 0.5, where the performance does not fully meet the requirement. They express, in quantitative terms, the value of environmental quality aimed at humanization.

So for each spatial unit there have been obtained indexes that express in numerical terms, the value of environmental quality aimed at the humanization.

2. CASE STUDIES

The case studies represent a range of different design experiences, hospitals built in the last ten years in industrialized countries. In these buildings the designers have demonstrated attention to the definition of design solutions oriented to the humanization of space.

The analysis form of each case study is organized into three parts. In the first part of the form, there are general information about the history of building, the location and the relationship with the place, the materials characterizing the exterior surfaces, the utilization of non-traditional building technology and the presence of qualitative elements such as gardens, art installations or places for spirituality.

The second part of the form, on the basis of reference tables, relates the assessment of characterizing areas for humanization (entrance hall, corridors, rest and waiting areas, patient rooms and day rooms).

In the third part, for each area, a brief comment has been drawn showing the points of strength, weaknesses and possible innovations.

Comparative assessment of the case studies highlights architectural trends, spatial potentiality and compositional variations, of such spaces.

The case studies are 32 (9 in Italy, 3 in Austria, 8 in Germany, 3 in France, 3 in Spain, 3 in United Kingdom and 2 in Turkey and 1 in Israel).

Entrance hall is mainly as a *Street* or a *Square*, but there is a substantial number of cases which can't be related to these "traditional" types. These are spaces having only the reception, the stairs and the lifts, the waiting areas and, sometimes a cafeteria. They are generic "hall". Few examples are hybrid, a crossbreeding between the *Street* type and the *Square* one.

Figure 1: Part of the form about Graz-West State Hospital (Austria).

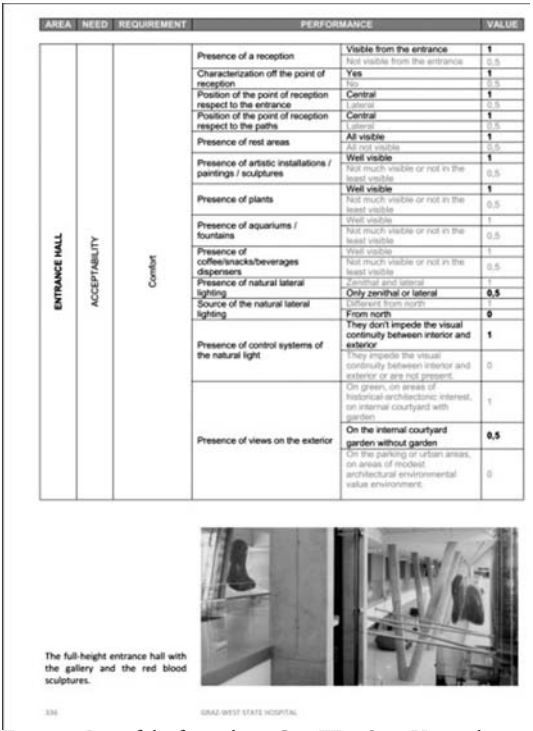

Figure 2: Part of the form about Graz-West State Hospital (Austria).

A strong element, recurrent, in the latest architectural expression, is that of a large open route, which from the entrance crosses the entire complex, both horizontally and vertically. It is a place of enormous connection, not only functional, among the most used areas (both in care and in non-hospital services offered), but also perceptual. It's the "hospital *Street*" that, in particular morphological situations, can become a *Square*, like for example at Kentish Town Health Centre (London). A place that is the connective tissue of hospital pathways and spaces, a space that is also a "gallery" inside the hospital, continuously projected toward the urban space and the external environment. "The street as a figure", according to Arnheim (1981), where the traveler's eye directs the route supported by his experience of urban space and guided by the *impression* of the road that is "a sense of easy access, clear direction, boundaries defined to advance with confidence". Entrance hall is the site of the initial impact with the hospital, the interface between the healthcare facility and the user, the communications center and the junction of crossing flows. The morphology of the environment is particularly important. It can facilitate the identification of the main directions. The unitary language of the architectural elements and furnishings is important too. The presence of numerous and different activities, hospital and non, are representative of the accepting will of the hospital, respecting patient different needs and proposing an usage, not only hospital, of its spaces. So the building opens itself also to the territory and the social context where it resides. The double-height entrance hall of the Provincial Hospital of Graz (Austria), for example, is conceived as an exhibition space with minimalist furniture, works of graphic art and the work of Hans Kuperlwieser, a permanent installation of red blood sculptures that evoke the shape of human organs. Always in Austria, the entrance hall of the Hospital Center in Anichstraße, Innsbruck (Fig. 3) is a real public living room, with comfortable sofas, soft lighting and a nice garden view, here people can take a break and talk friendly.

A functional conception still different, influenced by that of the "mall", is that which indicates the entrance hall as the ideal forum for businesses. So, for example, the double-height hall of Agatharied Hospital (Germany) is dominated by a *promenade* that connects the ground floor to commercial activities at the first level. A magnificent example of entrance hall is the large covered one, enriched with luxuriant vegetation, in the new Mestre Hospital. This is thought to be a large garden square with reception, bar, restaurant, shopping areas, offices for the public, religious services and offices for the associations. On its façade, on the upper floors: the outpatient department, the day hospital, medical offices and wards.

Entrance hall in pediatric hospitals are even more daring. In the entrance hall of the Pediatric Clinic of Aschau (Germany), for playful and also therapeutic use, it has been prepared a climbing wall, 15 meters high and 4 wide. The entrance hall of Royal Alexandra Children's Hospital (Brighton, UK), offers a continuous sequence of fantastic and colored places that reproduce the different natural habitats with their animals. The 'bioclimatic greenhouse', of the Meyer Children's Hospital (Fig. 4) in Florence is a laminated wooden structure, it is like a fairy forest. Within a very bright environment the "kiosks" for information and acceptance are located near the waiting areas, whose colorful character is part of a larger artistic project. In this art project, coordinated by the designer Andrea Rauch, every single interior is designed as part of an imaginary tale: the *artistic glass*, separating the giant waiting room from the service corridors, gives stylized natural forms; the *zodiac* is made up of a group of metallic installations suspended; the *clouds in the sky* are a group of paintings placed along the walkways connected and under a large skylight; the *light* cones are two great spinners coated ceramic glazed in bright colors; the *fantastic fishes*, the *multimedia installation*, the *sails as curtains*, the *care toys*.

Although the hospital is a building complex, also for the distribution, the user should be able to perceive it as simple and cross it instinctively, without being confused. So the presence of a system of wayfinding assumes a fundamental role, contributing to the construction of mental maps. For example, in the Circolo Hospital and Macchi Foundation in Varese, a sequence of color was adopted for different floors. It is based on the balance principle of the 'harmony of the four colors' by Jorrit Tornquist, international artist. Four different pastel colors are alternated, with a modulation exponential of brightness, from lower floors (dark) to the highest (unclear). Where the transition is fast, colors are more saturated, while in the living areas the colors are de-saturated. In a wayfinding system are important: the visual, acoustic and tactile signs and also the lighting and the shape and distribution of the ways. In fact, these are often sewing up among different parts, instead of an organic and contextual operation of the whole building. Sensitive points in the design of the routes are: landings of stairs and lifts, which must be clearly identifiable, and the waiting areas, presence and location, which need not to be an obstacle for either visual or walk.

Corridor, as the same word of Latin origin means, is a fast link where the soldiers, under siege, ran between the towers of the fortification. The corridors of modern hospitals, unfortunately, give the same sense of danger, siege and anxiety, trying in vain and for a long time to look for a never seen destination that seems unattainable. The feeling of futility of the elapsed time is associated with those of the isolation and the rejection, the inaccessibility of space and the unknown (Pellitteri 2008). Corridors of cases studied show that, despite the lengths shorter and less tortuous paths, are still

Figure 3: Hospital Center in Anichstraße (Innsbruck, Austria) - entrance hall, corridor, patient room (Nickl-Weller 2007).

monotonous and anonymous. In addition to the aforementioned system of *wayfinding*, some design choices work positively for the perception of their spatial and functional property: the proportions of the cross section, the length, the views toward the exterior, and views of interior spaces placed at multiple height, the integration between natural and artificial light and the color of the walls and the flooring. Color is not just essential for guidance, but also, according to the studies of *Biological Perceptibility*(Bertagna 2008), it is crucial for correct perception and space usage. Man has the psychological need to walk on a "solid basis", dark colors, recalling those of "ground" (brown, yellow and red), are recommended.

Even the waiting areas, such as the journeys, are not always designed together to the building functional articulation. They are often made out of residual space. They are peripheral to the area to which you have to access and don't show any element (an exterior view, an art object, the composition of plants, etc.) drawing attention to the user, detaching him from his stressful waiting.

Outlining the requirements and performances of waiting areas, it is necessary to distinguish different types of 'waiting', because different ways of using and different psychological needs correspond to each of them. Waiting areas of the outpatient hospitals are characterized by a high state of anxiety and emotional tension and a perception of dilated time. In the atrium the waiting support to other functions, have a considerable degree of representativeness and there is a greater tendency toward socialization, among users and users/operators. The waiting areas in the corridors, punctiform through the building, have the force of disruption and characterization of pathways and they are an extension of functional areas more defined. Among the cases investigated are reported some German examples. The waiting area in the outpatient clinic of Radiotherapy in the Hospital Center Ostalb Aalen, has a courtyard garden and also a large aquarium participating at the space composition. The rest area in the entrance hall of Children's and Gynecology Hospital Carl Gustav Carus in Dresden is a wide area extended along the entrance hall opening into the garden with a terrace. The rest area, set along the path connecting outside with the central covered atrium in Albklink Hospital, proposes in the size and furniture the intimacy of a domestic living room.

Together with the entrance hall another area subject of special attention is the patient room. There are more avant-gardes examples in profit health system. These rooms, using the studies of Evidence Based Design, have hotel-like characteristics. They improve patients' quality of life. Inside the room a semi-private area is foresaw. This is a living that allows more and better interaction between the patient and the family members who assist him, ensuring a greater sense of 'territoriality', too. From the room the patient can see outside. In temperate zones, the rooms are also equipped with a solarium, to enjoy the therapeutic effects, including psychological, of the sun. The furniture, taking care to the tactile and visual characteristic, allows customizing the environment by patients. However, medical instruments and equipment technology tend to be camouflaged, almost hidden. Patients may act independently on the systems of lighting/dimming and on those for the temperature control in the room. Two particularly significant examples of the trend that wants the patient room similar to hotel ones, are the patient rooms in the Evelina Children's Hospital (London, UK) and in the Angel's Hospital in Mestre (Venice, Italy). Both have no hospital furniture-type, the medical equipment is hidden, and patients can look out of the room and onto the atrium, or can close dimming systems, resulting in privacy. These rooms are open and permeable areas within the hospital building, they aren't areas of segregation.

Figure 4: Meyer Pediatric Hospital (Florence, Italy): entrance hall, waiting area, corridor (Belvedere 2010).

A space where the project is not careful as in the patient rooms is the day room. Indeed, not all the hospitals surveyed are provided of it. Probably, this is because the patients' rooms, even when they are not hotel-like, have within living/sitting areas, used by the occupants to receive visitors or to socialize with each other.

3. GUIDELINES FOR HUMANIZATION

We have defined the guidelines providing the designers' choices for the humanization (there are not contemplated others design aspects) of each area above mentioned, from the analysis and evaluation of the case studies and the actual theoretical studies. They are aimed at the architectural design of new hospitals, even if they can be applied to existing buildings and some of them might not always be coherent with the culture and any specific local need.

For each requirement, if not for each area, the arguments related to the individual elements constituting the space (paths, architectural elements, signs, etc.) are highlighted. Also the relations that the spaces have with the outside of the building and with other related parties orientation; size; organization and distribution; lighting and perceptual aspects related to the shape, the color, the materials, the finishes are highlighted.

Regarding the need of **Recognition**, the guidelines of the **Entrance Hall** are reported for example (Table 3 and Table 4).

NEED	REQUIREMENT	GUIDELINE
Recognition	Visibility	The paths, also from the parking area to the entrance hall must be clear and legible: - those vehicular must be distinguished from the pedestrian ones; - both vertical and horizontal signs must be present; - if longer than 50 meters, they must include a waiting area clearly identifiable; - must be adequately lighted.
		The outdoor areas, if available, should be used as garden and provide parking at no more than 50 meters from the entrance.
		Parking: - in small hospital building (no more than 500 beds) can be buried, thus allocating superficial areas as garden.
		Architectural elements (canopies, overhangs, recesses, arcades, etc.) can be placed on the façade, showing the location of the entrance. They must be distinguished in shape, color, materials and finishing. - colors must be complementary or otherwise contrary; they must not be of the same tone; - if the materials are the same, finish / texture must be different.
		Entrance must be lighted to be visible at night.
		The shape of the building must be lighted to be seen easily in the urban/territorial area.
		The luminous must be clearly visible from a distance: - color is different, preferably in contrast with background; - position must be predominant, with no visual obstacle, and lighting the entrance; - dimensions must be related to those of the building.

Table 3: Guidelines of the Entrance hall.

NEED	REQUIREMENT	GUIDELINE
Recognition	Representativeness	Position of the entrance hall must be the gravity center of the building complex, otherwise it must be the focus of streams and paths and related and connecting with the different areas and functions of the building.
		Architectonic elements and furniture, like information desk, sculptures, columns, etc.: - can be placed on a side and/or centrally in the entrance hall; - can be placed on a side, not interfering with the path, if the entrance hall is mainly longitudinal (*Street* or *Gallery*) - can be placed in the center if it is not a visual obstacle; - must harmonize in color and material with the context; - can be accentuated or damped cooperating in relation to all the environment; - It is advised against monochrome and monomateriality.
		Materials of floors, retaining some of the exterior characters and preparing to introduce to the interior spaces, must be different from both the interior and the exterior ones.
		Brightness must be different in singular areas/spaces: - waiting areas must be lighted differently than path; - lift landings must be lighted differently than entrances to services.
		Artificial light must complement the natural one. It must be dosed related to the specific area, to the type of activity and number of people that are inside.
	Spatiality	Entrance must not be directed near the North.
		Organization of areas and services with their main and secondary vertical and horizontal systems must be simple, obvious and clearly distinguishable.
		Geometry of the entrance hall must be clear and ascribable to primary geometric forms. In small hospital building (no more than 500 beds): - *Street* or *Gallery* type, which primary form is a rectangle, should have width not less than 5 meters and length from 50 and 80 meters; - *Square* type should be 30 meters in length; - "Covered patio" type should have a length no more than 15 m.
		Section must be rich and varied, showing changes in the shape of coverage, especially in correspondence to the different space uisage. If the height is constant, it is recommended that the height is not equal to or less than the width, because the space is perceived as oppressive (in the *Square*) or monotonous (in the *Street*).
		Natural light must be filtered by control systems that must not impede the visual continuity between inside and outside.

Table 4: Guidelines of the Entrance hall.

4. CONCLUSIONS

The methodology of analysis and assessment elaborated is here presented in order to verify if hospital spaces are designed for their humanization. From the case studies we have seen that the goal of humanizing hospital spaces sometimes is centered. Many times it remains a designer's intention because functional requirements or economical purposes prevail over humanization needs. When designers are free to take into account also this fundamental aspect, we can find architectures qualitatively acceptable. Humanization improves spatial and therapeutic features, so it improves architecture. Then, our research wants to define an approach to design not based on a "good practice" but on a scientific methodology, aimed to write specific guidelines for humanizing hospital spaces. Guidelines are a way of suggesting a system of criteria for designing new spaces or to adequate the existent ones. Certainly, they have to be verified experimentally with a really project and they are susceptible to further careful examination.

However we can highlight some critical aspects. First, the field of research isn't limited to the areas that we have considered. In fact, there are many hospital spaces like outpatients' departments, day hospitals, diagnostic areas that are very important, too. In these areas the medical aspects often exceed the human one. In recovery rooms and intensive care unit the contrast between the technological sophistication of modern medicine and the incapacity to consider adequately the human needs is the most evident. The patient, even if "passive", is very sensitive to the environmental quality around him. Other areas external to hospital have an important therapeutic role, i.e. the healing garden, and they are important for the relations between the building hospital and the urban and landscape context Another field of study concerns the user. Our research actually considers only the patient, but in the future we might consider the staff, too. Consequently, we'll study another side of humanization, related to workplaces.

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