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PROCEEDINGS

11th INTERNATIONAL SPACE SYNTAX SYMPOSIUM



3 - 7 JULY 2017

PROCEEDINGS OF THE 11TH INTERNATIONAL SPACE SYNTAX SYMPOSIUM

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EDITORS

Teresa Heitor
Miguel Serra
João Pinelo Silva
Maria Bacharel
Luisa Cannas da Silva

DESIGN

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Luísa Cannas da Silva e Maria Bacharel
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RESPONDING TO USER CULTURAL NEEDS IN HOSPITALS WITH THE SUPPORT OF SPACE SYNTAX ANALYSIS

GRAZIA GIULIA COCINA
 Polytechnic of Turin
 graziacocina@gmail.com

ABSTRACT

As part of a research project about hospital humanization, this study applied Space Syntax analysis techniques to answer two key research questions:

- is it possible to evaluate the experiential path of the user within a hospital by introducing configurational parameters that take into account the relationships between spaces?
- Can configurational parameters be used to understand how much hospital space meets specific cultural needs in order to develop spatial indicators which can satisfy immigrant user needs?

Space Syntax methodology deals with both questions. It interprets architecture as the essence of relationships and asserts that culture plays a fundamental role in the design of a building and in particular in the determination of its spatial forms (Hillier and Hanson, 1984; Hillier, 1999).

A distinction between general and immigrant users has been made due to the different needs of the two categories. Each user need has been associated with specific spatial requirements and environmental and configurational indicators. Environmental indicators refer to the presence or absence of environmental factors that can affect the user's psychophysical well-being. Configurational indicators refer to the syntactic properties of the space for which the Space Syntax methodology tools were used.

The indicators identified were then applied to the spaces that form the outpatient path of a hospital/ case study in Turin and a rating was assigned to each of the analysed areas according to the satisfaction level of the indicator. In this way feedback was obtained on the degree of humanization of the structure considered. This feedback can simplify the identification of areas which are most in need of improvement to meet user demands.

In this study, therefore, the measures and configurational analysis of Space Syntax were used as a response to spatial requirements arising from cultural needs, combining spatial analysis and quantitative measures with abstract socio-cultural constructs. The Space Syntax tools were then used as a link between the cultural features of the users and the configurational aspects of the spaces.

KEYWORDS

Cultural needs, Space Syntax analysis, hospital humanization.

1. INTRODUCTION

In order to improve the user's well-being, in recent decades it has become necessary to rethink the hospital system and the physician-patient relationship with the focus shifting from the disease to the patient and his functional and psycho-emotional needs. In this context, it has become necessary to give increasing importance to the role that the physical environment plays on the user's behaviour and well-being.

This interest in the health sector began to assume increasingly more importance with the birth of the environmental psychology discipline, whose research demonstrated that the environment deeply affects people's behaviour, their ways of relating and their physical and psycho-sensory well-being, becoming one of the decisive factors for the quality of the service.

The environments designed therefore, are no longer called to meet only functional requirements, but they also have to take into account many aspects that affect the psychological and social sphere of the user. This is especially true for health care facilities, in the middle of a radical change that involves different disciplines (medicine, environmental psychology, ergonomics, proxemics, architecture, sociology, hospital hygiene) with the common goal of improving the welfare of patients and staff. This tendency towards hospital humanization is based on the need to add psychological criteria to the functional ones, in order to avoid a state of discomfort, and stimulate a responsive attitude towards the patient's disease.

The above is made even more necessary by the evidence that, in the past, health facilities have focused only on aspects related to medical activity. They assumed spatial configurations, functional structures, logical fruition and organizational models that were totally indifferent to issues related to the needs of patients and health professionals. Despite the undeniable benefits achieved with the development of technology in hospitals, the efficiency and quality of medical care has not been sufficiently addressed.

The lack of attention towards the psycho-social dimension of the users leads to a negative and "inhuman" image of the hospital in the collective imagination. In fact, the idea of humanizing a hospital can appear a paradox as if it was "*born as an expression of humanity and charity, it should have by definition a human vocation*" (Catanati and Cambieri, 1990).

The increase of interest in psycho-sensorial needs finds its realization in a design approach called "user-centered design" (Gifford, 2002), which aims to design spaces taking into account existing or future users point of view and then putting them into the spotlight.

In literature there are many studies on the influence of the built environment on human health and the potential architectural and environmental aspects which may constitute stressors. Only few studies, however, cover the subject in a broader view, taking into account not only the necessary requirements for individual spaces, but also the relationships between them, thus providing a "*comprehensive*" response to the user experience within the structure, in a configurational perspective. In addition, among the users on which is usually placed more attention because considered "*vulnerable*", a category with specific cultural needs such as that of immigrants, has not been given enough consideration, even though it is becoming increasingly important in the contemporary society. This increasingly presence puts the social-health services in a difficult position of responding to the demand for care of populations from different cultural universe, in order to promote their integration.

This research is based on the detailed-study of these two aspects with the aim of proposing an innovative methodology of analysis, based on the idea of spatial configuration and attentive to the needs of users with cultural diversity.

2. WHY IS IT IMPORTANT TO CONSIDER THE CULTURAL NEEDS OF IMMIGRANT USERS?

Dealing with the cultural needs of immigrant users is particularly important in the healthcare field for several reasons: on the one hand, the different ways of conceiving illness and care cause communication difficulties between physician and patient. On the other hand, the different

conception of space - which are culturally bound – can affect the appropriate use of services. These issues lead to the under-utilization of public services by immigrants.

The ethnic, linguistic and religious diversification that increasingly characterizes these users requires the introduction of specific solutions in the organizational and the spatial field in order to meet their needs.

If it is true that humanization extends the concept of health to the psychological and social dimensions of the user, emphasizing the relationship between health and the socio-cultural context, it also needs to take into account the needs derived from specific cultural characteristics.

In fact, in every human community, the representation of the body, how to deal with illness or conceive spaces, are strongly related to cultural characteristics and beliefs, which often differ from one society to another (Delle Fave and Massimini, 2001). The human being can in fact be considered the heir of genetic heritage but also of a culture: people receive from the cultural environment in which they are born and develop a number of behavioural instructions that they translate into daily actions. Culture, transmitted from generation to generation, provides the individual with a repertoire of behavioural patterns that affect the different ways of conceiving health and space. Cultural identity is the symbolic apparatus through which a subject is placed in a certain context characterized by time and space.

The way in which the physical body is perceived and cared for, is strongly influenced by the culture: the perception of the body is proper to each of us, and it is linked both to the subject's history and to her culture. The way in which personal space is articulated and how it is lived is coherent with the inner world of the person. It also depends on the context and socio-cultural values: deep cultural patterns involve different perceptive systems in different populations. Each culture then organizes space in its own way. For this reason, an inadequate knowledge of cultural differences in perception and space management could easily lead designers and architects to the mistake of building spaces in which a lack of attention to the needs and languages of the various ethnic groups could alienate many immigrant users. Meeting the demands of cultural diversity is not aimed at creating dedicated and exclusive solutions for immigrant users, but rather at paying more attention to their needs. This is an opportunity to improve the quality of services for all users in an inclusive way.

3. THE SPACE SYNTAX METHODOLOGY AS THE ANALYSIS TOOL

For its ability to link spatial and social issues, the Space Syntax methodology was considered a useful support tool to deal with the research topics identified.

In fact, it develops important theoretical aspects of the relationship between space and culture and proposes spatial analysis that are based on the concept of space configuration and the users' perception.

In particular, this methodology faces the two key themes of my research: on the one hand it defines the architecture as the essence of relations between space and society, and on the other it affirms that buildings are the bearers of culture, which plays a fundamental role in shaping space (Hillier and Hanson, 1984).

One of the key concepts of Space Syntax is to understand architecture as the essence of relations between space and society. The theoretical bases start from the hypothesis that space contains in itself psycho-social information that are able to be explained through the spatial configuration.

The spatial layout therefore has an important influence on human behaviour. The way in which the places are connected is directly related to the way in which people move and interact. The spaces' organisation inside a building is equivalent to the organisation of the relationships between people.

Although this analysis tool cannot replace the traditional functional analysis, it adds additional information not visible to the naked eye, by introducing a quantitative study of space and its

ability to influence human behaviour. The content of the configurational properties of space will then be integrated with the data that the designer obtains from further analysis, in relation to his research questions. The results obtained are never absolute, but they have to be carefully evaluated according to the set goals. The analysis made through Space Syntax contain the characteristics that refer to how people perceive space. Space Syntax in fact does not explain why people behave in a certain way, but how it is more likely that they will act. Therefore, all parameters contained within the analysis software used have been designed and developed according to these principles.

In addition to the theme of the relationship between space and its configurational properties, this methodology deals with another key topic of this research: the relationship between space and culture.

Specifically, Space Syntax argues that culture plays a fundamental role in the design of a building and it calls "*genotype*" the cultural structure that remains unchanged along the generations in the design process (Hillier et al., 1987).

Again, Hillier (1999) affirms that "*spatial organisation through buildings and built environments becomes one of the principle ways in which culture is made real for us in the material world, and it is because this is so that buildings can, and normally do, carry social ideas within their spatial forms*". So, the society expresses its nature through the shape of the buildings.

The architecture is thus considered "*social art*" not only because the buildings are important visual symbols from the individual and collective point of view, but also because, thanks to the way they create and organise the space, we can recognise the society they refer to. Therefore, culture and social aspects, are considered key factors that can give shape to space.

Because of this dual role and ability to face both aspects related to the configuration of the spaces and the relationship between space and culture, the Space Syntax methodology was chosen to answer the main research questions:

- is it possible to evaluate the experiential path of the user within a hospital by introducing configurational parameters that take into account the relationships between spaces?
- Can configurational parameters be used to understand how much hospital space meets specific cultural needs in order to develop spatial indicators which are able to satisfy the immigrant user needs?

4. DEVELOPMENT OF THE ANALYSIS METHODOLOGY

For the development of the proposed analysis, the experiential path that users take within the hospital is taken into account. From this point of view a hospital can be analysed according to different paths: emergency, hospitalization, outpatient etc.

This research focuses on the outpatient path as it is definitely the one in which the user has more autonomy of action and the most popular with the category of immigrant users on which the research makes a specific focus. Moreover, outpatient activities are currently at the focus of attention and redevelopment to lighten the other over-used services. The spaces analysed are those which correspond to the procedural steps that the users have to do during his experiential path within the hospital (Simoncini et al., 2013).

Usually, users, on their outpatient path, take the following steps: they enter into the structure, they go to reception, they wait for their turn in the waiting area, they relate with the operators at the acceptance area, they pay ticket for the service to be received, they wait their turn again, and finally they receive the required service. Within this research all the steps analysed are those that happen within the structure between the access and the provision of care, in places where the user can move freely without any special permit or need to be accompanied by the members of staff.

For this reason, the areas of the entrance and the visiting room are indicated but not analysed: the first one in fact has a relationship with the interior of the structure but above all with the

external environment, while the second one does not come into the spaces which the users can access without staff. The analysed spaces are therefore the reception, the acceptance and the waiting areas to which are added also the horizontal and vertical connections (corridors, stairs and lifts) that, although they cannot be considered steps, they deserve to be considered as elements of union of all the other steps.

All these spaces are analysed through the application of certain indicators which have been assigned a different weight depending on the category of users referred to. At the end, the weight of each indicator, divided by spaces, has been multiplied by the value of the judgment that has been attributed to them in order to obtain the final evaluations for each step of the path taken into account. Thanks to these evaluations it will be easier to identify the areas most in need of improvement interventions, and give attention to the most critical indicators.

5. DEFINITION OF THE REQUIREMENTS AND INDICATORS FOR THE DIFFERENT USERS CATEGORIES

The first step was to study the profiles of users who use the health facilities. Given that the objective of the research is to bring out how a hospital meets the specific needs of people with cultural diversity, users were divided into general and immigrant users. Regarding the latter, a further study was made analysing the Moroccan culture which is strongly rooted in Turin.

For each category specific needs were studied, in order to define spatial requirements linked to environmental and configurational indicators. The first relate to the presence or absence of environmental factors that may affect the user's psycho-physical well-being (for example natural and artificial light); the latter refer to the syntactic properties of space that are not directly visible to the naked eye but which play an important role in conditioning the behaviour of users in space (e.g. the topological connections, visibility, permeability etc.). In order to develop the configurational indicators, the Space Syntax methodology was used, intended to study the configurational characteristics of the space and their influence on the movements of people.

5.1 GENERAL USERS

For general users three macro-needs were identified to which specific spatial requirements and indicator were linked.

Needs	Spatial Requirements	Indicators	Type Of Indicator	Spaces Analysed
Environmental well-being	Outside view	Visibility and quality of outdoor spaces	Configurational	Waiting area; Corridors, stairs lift
	Restorative potential	Presence of restorative elements	Environmental	Reception; Acceptance area; Waiting area; Corridors
	Restorative potential	Presence of facilities for the users	Environmental	Corridors; Waiting area
Psycho and emotional well-being	Colours and decorations that contribute to psychological and emotional well-being	Quality of the colours and decorations of finishes and furnishings	Environmental	Reception; Acceptance area; Waiting area; Corridors, stairs, lifts
	Natural lighting	Coefficient of natural lighting	Environmental	Reception; Acceptance area; Waiting area; Corridors, stairs, lifts
	Artificial lighting	Artificial lighting features	Environmental	Reception; Acceptance area; Waiting area; Corridors, stairs, lifts
Security and usability	Usability in conditions of safety	Presence of supports and characteristics of the space to ensure the usability	Environmental	Reception; Acceptance area; Waiting area; Corridors, stairs, lifts
	Be acceptable for various types of users	Ergonomic solutions suited to different types of users	Environmental	Waiting area

Table 1 - Link between needs of general users, spatial requirements, indicators, type of indicator and spaces analysed.

5.2 IMMIGRANT USERS

The most important requirements in the study of immigrant users from the architectural point of view, that came to light in the study of literature, were those relating to wayfinding, communication and privacy. These macro-needs, although important for all users, are crucial for immigrants, and for this reason, it is necessary to pay more attention to them when this category of users are analysed. As we have seen before, space relations are experienced differently depending on the culture of the person and this can affect the spatial requirements to which spaces have to respond.

Specific spatial requirements and relative indicators have been associated to these three macro-needs and applied to a specific space of the user path analysed. The requirements and the indicators identified, although they derived from the need to improve the immigrant user experience who meets more difficulties in these three areas, are also an opportunity to improve the services for all users.

Needs	Spatial Requirements	Indicators	Type Of Indicator	Spaces Analysed
Wayfinding	Space accessibility	Value of Integration	Configurational	Corridors; Reception
		Proximity with integrated spaces	Configurational	Acceptance area
	Route clarity	Visibility from the previous step of the path	Configurational	Reception; Waiting area; Corridors
		Number of spaces crossed	Configurational	Reception; Acceptance area; Waiting area
	Identifiability	Presence of elements which ensure the recognition of the place	Environmental	Reception; Acceptance area; Waiting area
Ease of wayfinding	Presence of elements which facilitate the wayfinding	Environmental	Corridors, stairs, lifts	
Communication	Ease of relationship between operator and user	Operator position in relation to the access flow	Environmental	Reception
		Presence of elements that affect the relationship between operator and user	Environmental	Reception; Acceptance area
Privacy	Privacy of the space	Presence of through flow	Environmental	Waiting area
	Visual and acoustic privacy	Solutions that promote privacy	Environmental	Reception; Acceptance area

Table 2 - Link between needs of immigrant users, spatial requirements, indicators, type of indicator and spaces analysed.

5.3 MOROCCAN USERS

After the focus on immigrant users it was decided to make a further study of a specific culture. As was seen from the study of literature, in fact, every culture has different ways of behaving and of conceiving health and space. For this reason, in addition to the needs that characterize this vulnerable category, there are others that change depending on the culture taken into account. In this research, the Moroccan culture was studied in depth in order to bring out its main features by which the specific needs were later identified. To these needs, spatial requirements and indicators were associated and applied to the spaces of the out-patient path identified.

In this case, socio-cultural features were translated into needs and then spatial requirements which are linked to specific configurational and environmental indicators. During this phase, several professional figures were interviewed with the aim of better understanding Moroccan culture. Interviews were not set with the aim of obtaining significant quantitative data, but in order to match what has been learned from the study of literature with direct testimonies of professionals which are familiar with this community with the objective of developing a framework that is as pertinent as possible to reality. The professional figures met were:

a professor in demoeanoanthropological disciplines (cultural anthropology and medical anthropology); an MI.SA (Migration and Health) clinic of the Amedeo di Savoia Hospital in Turin; a physician responsible for Turin’s ISI (Health Information Immigration Center); the President of the Cultural Mediator Association of Piedmont and cultural mediator at the Regina Margherita and Sant’Anna Hospitals; a cultural mediator and member of the A.M.E.C.E association (Association Maison d’Enfant for Culture and Education); various members of staff from the Moroccan Consulate in Turin.

What emerged was not a detailed anthropological analysis of Moroccan culture, but rather the result of various contributions that have allowed to better identify the needs of this category of users.

Cultural Features	Needs	Spatial Requirements	Indicators	Type Of Indicator	Spaces Analysed
Tendency to create informal relations, importance of physical contact	Relationship spaces that facilitate meeting and interaction	Multi - functionality and spatial flexibility	Presence of elements that encourage interaction between users	Environmental	Waiting area
Great sense of community and sharing; horizontal social organization	Spatial conformations that allow communication between staff and users	Ease of relationship between operator and user	Elements of the acceptance desk that affect the relationship between operator and user	Environmental	Reception; Acceptance area
High level of privacy	Presence of morphological elements that allow visual and acoustic privacy	Visual and acoustic privacy	Solutions that promote privacy	Environmental	Reception; Acceptance area
Traditional architecture consisting of a central plan with a nucleus from which it is possible to supervise all spaces	Easily controllable spaces	Path control	Step Depth from entrance	Configurational	Reception; Acceptance area
		Control area	Visibility of points of interest from the area analysed	Configurational	Waiting area

Table 3 - Link between cultural features of Moroccan users, needs, spatial requirements, indicators, type of indicator and spaces analysed.

6. APPLICATION OF THE SPACE SYNTAX CONCEPTS IN THE RESEARCH

The identified indicators were examined in depth through an accurate description and then applied in the out-patient path of a hospital case study in Turin. The following are some of the configurational indicators which use the tools of the Space Syntax methodology.

The choice felt on the Axial line Analysis which, making use of the potential lines of movement to perform their own analysis, is the most appropriate to represent the experiential path that the user takes within the structure.

Specifically the measure of *Integration* was used, that expresses how accessible and well connected each spatial element of the system is compared to the others. This measure has been applied in two different ways: on the one hand to bring out the degree of accessibility of the main corridors, on the other to see how much spaces like the reception and the acceptance areas are accessible according to their degree of proximity to the more integrated areas of the system. Both of these aspects are inherent to the wayfinding requirements, extremely important for immigrant users.

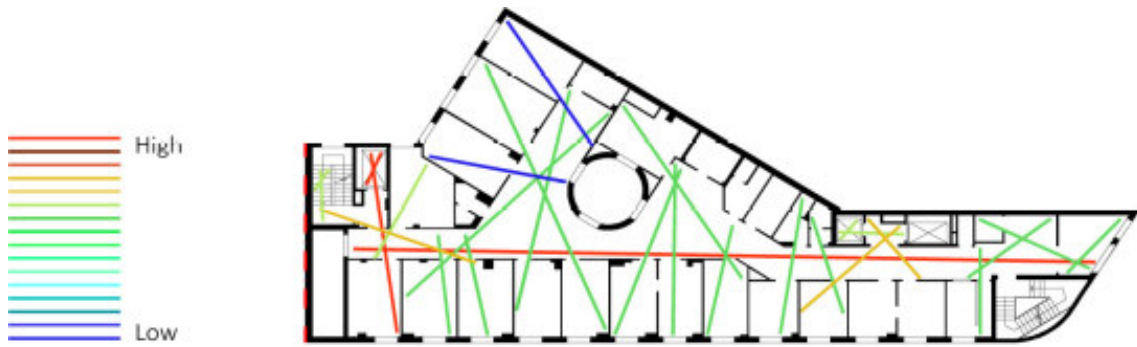


Figure 1 - Application of the "Value of *Integration*" indicator, used to assess space accessibility (Table 2).

From the map it is possible to see how the main corridor on the upper floor appears to be the most connected part of the whole system presenting a red axial line (high integration value).

To respond to the requirement of route clarity, which is very important for immigrants, the graph system was used, in which each node corresponds to a convex space (space in which all people can see all others), and each line corresponds to a connection between them. In this case, the measure used is the *depth*, which indicates the number of spaces that have to be crossed to go from one place to another.

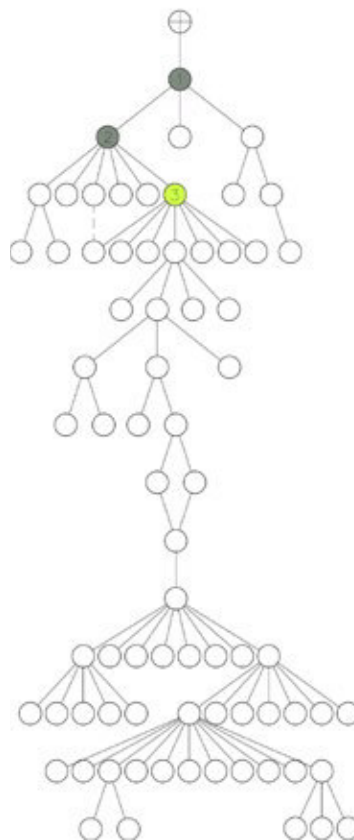


Figure 2 - Application of the "Number of spaces crossed" indicator, used to verify the route clarity to reach the waiting area of the main acceptance from the entrance (Table 2). In the graph, the waiting area connected with the main acceptance is located 3 steps from the entrance, which is a very good position for its role.

Furthermore, on several occasions, the *isovist* technique was used, which correspond to the area directly visible from a point. In particular the *isovist* was used to evaluate the degree of the control area (for Moroccan users), the route clarity through the degree of visibility from one space to another (requirement which is liable in particular to the orientation need of the immigrant users) and the outside view (for all users).

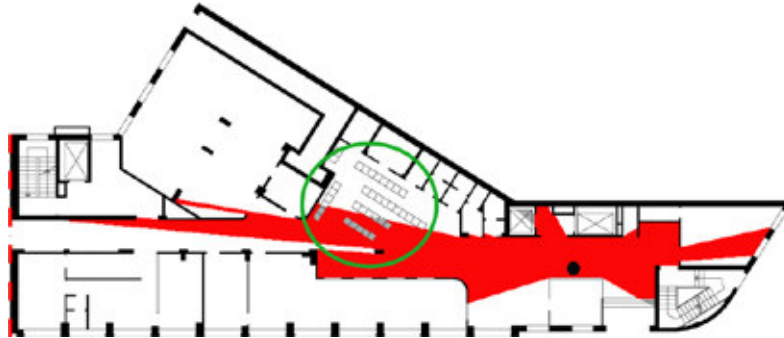


Figure 3 - Application of the "Visibility of points of interest from the area analysed" indicator, which respond to the spatial requirement of the control area (Table 3). The image above illustrates the application of a *isovist* from some of the stations of the outpatient waiting area, from which there is only a partial control of the areas of interest such as visiting rooms and services.

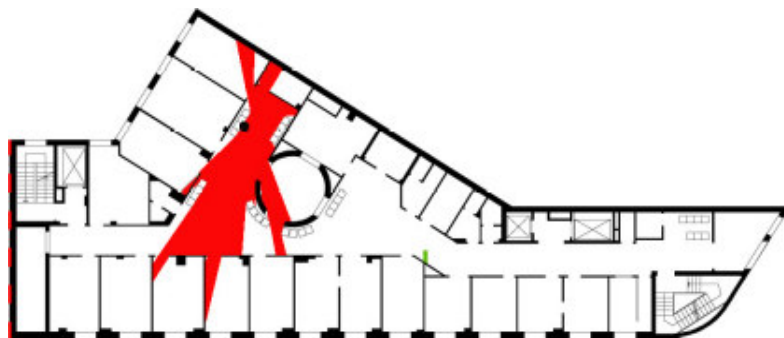


Figure 4 - Application of the "Visibility from the previous step of the path" indicator, used to verify the route clarity (Table 2). The use of the *isovist* shows how the acceptance waiting area is only partially visible from the previous step of the path (reception).

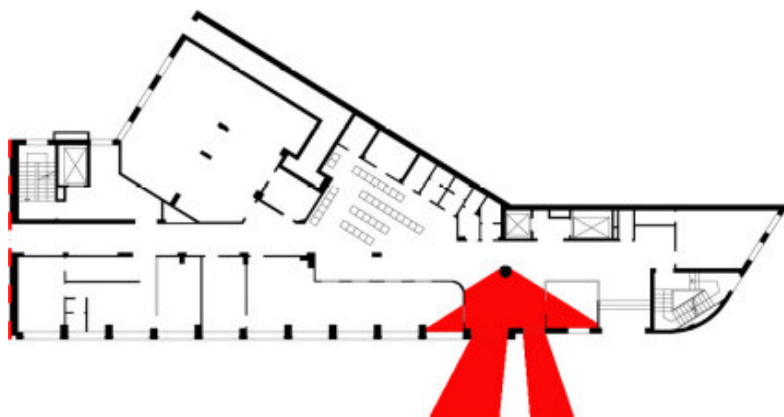


Figure 5 - Application of the "Outside view" indicator, used to assess the visibility and quality of outdoor spaces (Table 1). Even if there is no opening in the main corridor on the ground floor, a partial view to the outside is ensured by a window that is located in a space directly connected to the corridor. The view opens onto the main street where the hospital is situated.

The following provides a table summary with the list of the Space Syntax techniques and measures which were used for the elaboration of the proposed analysis methodology, the indicators that have been used, the requirements prescribed for the indicators and the category of users for which particular indicators and requirements are more significant.

Ssx Measure Or Technique	Indicators In Which It Is Used	Requirement Associated To The Indicator	User Category
Integration	Value of integration	Space accessibility	Immigrants
	Proximity with integrated spaces	Space accessibility	Immigrants
Graph	Number of space crossed	Route clarity	Immigrants
Step Depth	Step Depth from the access	Control of the path	Moroccans
<i>Isovist</i>	Visibility and quality of the outdoor spaces	Outside view	General users
	Visibility from the previous step of the path	Route clarity	Immigrants
	Visibility from the space to point of interest	Control of the area	Immigrants

Table 4 - Summary of the Space Syntax measures or techniques used.

7. CONCLUSIONS

After having assigned specific judgments and weights to each indicator, what is come to light is that, in the case study analysed, none of the areas taken into account has an excellent evaluation and the most critical space is the reception. In particular, the most problematic aspects of the reception are:

- the lack of direct visibility from the entrance;
- the no frontal position of the operator compared to the flow of people;
- the necessity of having to cross another environment before reaching the reception space;
- the presence of desk elements that impact negatively on the relationship between operator and user;
- the absence of solutions that ensure privacy during the recording of sensitive data;
- the absence of elements with restorative potential.

The developed methodology therefore, can help to identify the areas most in need of improvement interventions according with the users' needs. Moreover, it presents several innovative elements extending the concept of humanization in health care to a wider field of investigation and considering it from different points of view:

- firstly it focuses on a category of users which is often not considered, that of immigrants, and the spatial requirements arising from specific cultural characteristics. In particular, it proposes a model in which socio-cultural characteristics are translated into spatial requirements and indicators that are associated with specific analysis techniques;
- secondly it puts the focus on the experiential user's path analysing the spaces that correspond to the procedural steps that he meets in the building in relation to the health service he requires. Therefore, not only the characteristics of the individual spaces are considered, but the relationships between them acquire a fundamental importance, and consequently their configurational features.

These two issues are intimately linked because both the configurational characteristics of the spaces and the cultural characteristics of the users determine and influence the way we live a specific environment. Both of these issues are dealt with the Space Syntax methodology, which proposes a configurational approach of space considering on one hand the architecture as the essence of relations between space and society, and on the other highlighting how buildings are bearers of the cultural characteristics in the context in which they occur and how these characteristics play a key role in giving shape to space.

The elaborated methodology of analysis therefore, uses Space Syntax tools as a response to spatial requirements arising from cultural needs and as a link between the cultural characteristics of the users and the configurational aspects of the spaces.

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