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Communication in healthcare environments: some reflections on space syntax

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Abstract This paper focuses on the impact that the design and the experience of space in healthcare facilities might have on communication among healthcare professionals. First, we describe the space syntax theory that provides the theoretical and empirical framework to study the layout of space that puts constraints on function realization as well as affords capabilities to understanding and carrying out effective behavior. Then, we review the research on the configurational properties of space in healthcare and hospital facilities, which affect the provision of good healthcare service, with particular attention to communication that emerges as a factor of healthcare service quality. Finally, we argue that the analysis of the perception-action cycle and of communication on the grounds of the spatial layout needs further development and suggest that this work may contribute to the research on Medical Humanities according to a view of radical interdisciplinarity.

Keywords: Communication, Health, Space, Perception, Medical Humanities

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0. Introduction

Communication has been proven to be a determinant of health. Several studies show that the quality of patient-physician interaction has a clinical impact[1]. In the first place, it is widely accepted that a good communication reduces the possibility of medical errors. Furthermore, communication may facilitate the relationship between doctors, patients, families, and caregivers. Thirdly, it influences patient's satisfaction and enhances compliance, which refers to the degree to which patients correctly follow medical advice (medication, diet, exercise, lifestyle, etc.).

[1] Levinson *et al.* 1997, 1999, 2011; Groopman 2008; Bigi 2016; Corbellini and Pani 2017; Caporale and Zagarella 2020.

The relevance of time for communication and dialogue in the context of health has also been legally recognized: for example, in December 2017, Law 219/2017, 'Provisions for informed consent and advance directives', was approved in Italy (Di Paolo et al. 2019). Article 1, paragraph 8, states that 'Communication time between doctor and patient constitutes treatment time'. Considering communication time as treatment time is part of a shift in perspective through which people, their experience and their perspective are placed at the center of medicine.

In this respect, space is beginning to be considered as important for communication among healthcare workers as well as for interactions between health providers and patients, and consequently for patients' health and safety. Recent research is focusing on how environment affects healthcare work process and the quality of care provided to patients. It is worth noting that, while in the past hospital ward layouts were designed in order to minimize walking distances of healthcare workers, today a new measure called "Spaces for Communication Index" (SCI) «assesses communication opportunities arising from the layout, and shows that a high index is associated with the provision of good healthcare» (Pachilova and Sailer, 2020). In this context, this paper focuses on what impact the space of care might have on communication among healthcare professionals, by proposing some reflections on space syntax theory. Details about the space syntax theory can be used to develop spatial proposals for improving the quality of care; our purpose is to show that research on how to design well-functioning environments for healthcare professionals may benefit from a complementary discursive approach to the issue.

We believe that a reflection on our health experience in physical spaces is particularly important today, as the COVID-19 pandemic has completely transformed our living spaces forcing us to evolve and rethink homes, offices, schools, and cities. The importance of social distancing and recommended stay at home measures, the challenge of smart working, the rapid uptake of mHealth and telemedicine apps, the need to convert a space for triage, have already transformed our relationship with public space and probably will impact future design, perceptions and emotional connections with places (Honey-Rosés *et al.* 2020).

Our perspective arises from the experience we are gathering by coordinating the Medical Humanities Lab of the University of Palermo, which has been launched in 2018 in partnership with the Italian National Research Council. The main aim of the Medical Humanities Lab is to reflect on the complexity of "health". As defined by WHO Constitution, «health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity»[2]. It is more than a biological and physiological phenomenon; it is a social, cultural, historical, and psychological phenomenon, which requires to be studied with concepts from the humanities. This vision has been labelled as "radical interdisciplinarity":

> methods and concepts from the humanities and social sciences must be *embedded* in the concepts and methods of the health sciences and public health, if we are to promote sustainable intervention capable of engaging with the complexity of health, healthy lives, disease and sickness (Clark et al. 2019: 2).

In other words, as stated by Hetan Shah (the Chief Executive of the British Academy in London) on Nature,

> we cannot improve global health if we take only a narrow medical view. [...] Scientific and technological innovation are necessary, but enabling them to make

[2] https://www.who.int/governance/eb/who_constitution_en.pdf

> an impact requires an understanding of how people adapt and change our behavior. That will probably require new narratives - the purview of rhetoric, literature, philosophy and even theology (Shah 2020: 577).

However, we would also extend the concept of "radical interdisciplinarity" to disciplines – such as psychology, architecture and environmental design as well as human-interface and human-computer-interaction – which have a direct impact on health communication and health care experience. Although such disciplines are not typically included among the humanities, they provide important elements for studying the so-called rhetorical situation. In this broad sense, Medical Humanities is considered a proper framework to undertake multi-disciplinary studies on health communication, particularly on emerging issues such as healthcare providers' communication space. In general, space syntax theory can be considered a case in which the approach of radical interdisciplinarity may use a consistent theory to treat healthcare issues that stand at the intersection of psychology, architecture, design, and humanities. Nevertheless, future research is needed to investigate the complex relationship between healthcare environment and situated discourses.

1. Space syntax: first space, then function

Space syntax is the theory of the spatial conditions under which the environments that have been shaped by human artifacts become places where subjects carry out their purposive behaviour. People take courses of action and interact as individuals or groups. The outcomes come to be aggregated at various social scales. The spatial elements and their combination that shape the environment constrain choices as well as afford opportunities for actions and the aggregation of their effects. Walls, doors, windows, corridors, rooms, fences, bridges, and outdoor places are instances of elements that provide constraints on and affordances to patterns of movement like encountering, avoiding, approaching or distancing, going along or away, through which social behaviour is realized. Buildings, facilities, and settlements show that space gives behaviour an order. The shape of their elements and units as well as the relations these hold with the surrounding environment embed functions. This shape and the spatial relation with the environment can also generate behaviour. On their basis new functions can be developed and innovative actions can be undertaken.

Initially developed to study the spatial logic of social behaviour (Hillier and Hanson 1984), space syntax theory has been extended to the spatial properties of arrangements (office settings), special purpose facilities (museum, hospitals, airports), urban networks, urban districts, and of the flows of communication and movement which bring their effects to bear on productivity, sales, traffic, crime, wayfinding, healthcare, city development.

The shape and the capabilities of built artifacts endow the environment with a structure that is the spatio-temporal manifestation of such processes as acquiring and sharing knowledge, partaking in meaning and common sense, spreading the outcomes of actions, pursuing one's goals. The space syntax aims at the analysis of the spatial structure that operates as a set of rules for social dynamics at local and global scales of aggregation of behaviors.

The properties of built artifacts that enable them to satisfy social and cultural functions are represented as units and relations through an abstract spatial layout. Units and relations are systematically coupled concepts. An element becomes a relevant unit to the analysis if it holds such a relation with at least two other ones that they are simultaneously co-present and make a complex in which the relation between any two

of them can be expressed to the third one that serves as a reference frame (Hillier 1996). If this condition holds, the properties of the units must be described in terms of configuration, because any change of one element affects the properties of many, if not all, the other ones of the complex, and the property of the complex can be changed with a single change of one element. Thus the term "configuration" points to the level of the analysis at which the manner the elements are arranged and interdependent on one another is more significant than the elements taken as isolated parts. In this sense, the same number of elements may bear different properties of configuration for their arrangement.

The theory has developed different methods to specify units and relations. Benedikt (1979) claimed that in three-dimensional space for a simply connected region bounded by a smooth convex boundary, one can determine a connected subset of points scattering lights as visible surfaces and a point from which they all are equally visible. The environment is the collection of all surfaces. Every subset of surfaces equally visible from a distinguished vantage point is called an "isovist". The isovist depends on the location of the observer, the surfaces depend on the environment. Accordingly, the isovist represents the observer's experience of space, its shape and size depend on the environment that falls under the perception. The shape varies as the space is simple, for instance, whether it is circular or it has angular edges, or complex, like the volumes defined by intersecting planes in an Eisenmann house. Among the measures of shape, some regard properties of the environment such as area (how much space is visible), perimeter (how many surfaces are visible), and circularity. Other measures regard the relation between surfaces under the respect of the observer's standpoint, such as occlusivity (how long is the visual boundary along which surfaces occlude one another), variance (how much dispersed surfaces are), skewness (how distributed surfaces are across variance). Isovists at adjacent points may differ. However, there will be paths along which the observer can get a sufficient number of isovists to see the whole environment. Among such paths, there will also be the shortest path. Size depends on the volume of solid objects falling within an isovist.

The measures of isovists allow describing the properties of space from within the visual and locomotory experience of observers. Furthermore, they allow discriminating among spatial properties according to the extent to which they become significant for observers' behavior. Thus models can be built that predict the kind and the magnitude of visual exposure space should have to be tuned to particular behaviors.

Hillier and Hanson (1984) suggested that space can be represented by increasingly larger convex polygons that cover increasingly greater extents of space so that for any two points inside a polygon there is no straight line that crosses its boundary. The concept of a convex polygon is considered to intuitively correspond to the shape of such a space that its points are mutually visible from anyone to the others. This concept captures the experience of a space that encompasses the observer. Once a system of convex polygons is overlaid on space, the least set of non overlapping polygons that cover all the space can be found. It can be impossible to define a minimal set that is also unique. However, Hillier and Hanson (1984) claimed that for a suitable decomposition of the space under consideration the least set of convex polygons can be determined, which are the least and at the same time the largest ones. For a point in this system, a straight line can be drawn along which the point can be maximally extended. By drawing all the possible straight lines for the same point in decreasing order of length, such that all convex polygons are crossed by a line and no two lines intersect twice, an 'axial' map of space is obtained. The lines of this map represent the points that are wholly visible from any other point for the greater extent of space. Surfaces are treated as sets of entirely visible coplanar points that lie between edges or corners. The axial map represents also

the paths along which a moving observer can traverse the whole space with the fewest changes of direction.

This kind of map can be built on the basis of tiling space into identical units determined at the suitable scale or size and a particular height level (Hillier *et al.* 1995). The size can be defined according to manifold criteria: the size of space, the ratio between real distance in space and the distance represented on the chart on which the axial map is to be built, the movements the workers need to perform in space. The level can be chosen to correspond to many levels with respect to the observer's body. At the eye level, tiling yields units equivalent to the isovists. At the knee level, furniture, entries and exits, elevators and stairs should be considered, all elements that hinder or allow passing from one part of space to another one. Thus tiling yields an accessibility map. At the floor level, tiling yields a permeability map that represents the relation between visible surfaces and possible directions and destinations of locomotion. Hillier (1996) extended tiling to shape, and the same configurational properties can be measured to specify the local and global structures of figures and solids on their own as well as employed as the plan or the layout of a spatial artifact.

Peponis *et al.* (1997) challenged the tenet that the selection of the largest convex polygons and the determination of the least number of them balance each other out by the choice of a particular decomposition of space without further requirements. For spaces without curves, they proposed a method for two convex partitions of space into informationally stable units, namely that preserve their relation to the discontinuities that determine the shape of spaces as they appear and disappear either for different standpoints or for the movements of the observer.

Different methods converge to general measures of meaningful import that can be applied to spatial artifacts. Connectivity measures the number of spaces with which a particular space inside the artifact is directly connected to other internal spaces. A direct connection is a relation that holds whenever two units meet, for instance when two surfaces meet at an edge or a corridor leads to another one or some rooms. Direct connections pertain to the topology of the artifact. They differ from the "mediated" connections that obtain whenever two disjoint units are simultaneously visible or co-visible from a standpoint. The relation of co-visibility is as much as important as the direct connection. It can be measured in terms of the visual connectivity of a surface with respect to other surfaces, namely by the number of surfaces whose all points are visible from a given surface (Peponis *et al.* 1998). Co-visibility can make a difference between spaces with the same connectivity. Notwithstanding artifacts may have adjoining surfaces with the same number of edges or corners, the arrangement of surfaces may be such that they would differ as to the smallest and the greater number of entirely visible complete surfaces from one of their standpoints. Visual connectivity is more sensible than connectivity to the shape of space one has experience of. However, this sensitivity depends just on the possibilities that the connectivity of a particular space gives to locomotion.

As a function of connectivity, the units of a spatial artifact may have a depth value. The depth of a unit is the measure of the number of connections by which it is progressively linked with other units at increasing distance. If one lets a unit be equivalent to a null point, the units to which it is immediately connected will form the primary level of connection at a depth value of "one" with respect to it. The secondary level of connection will be formed by the aligned units that are immediately connected to the ones at the primary level and through them to the initial unit. These units will have a depth value of "two". At each progressive level of connection, the depth of the aligned units connected with the initial one will be increased by the successive value. The depth value is a measure of the distance between any two units in connection rather than

metric terms. This measure quantifies how many units an observer has to pass through in order to get from one unit to another one among those that are connected in a given area. On this basis, the mean depth of a unit can be computed by summing all the depth values from a reference unit and dividing the result by the number of connected units minus one.

The integration is a measure correlated with the mean depth of a unit in comparison to other units of the artifact. It measures how closely connected a unit is to any other one or inversely the average distance at which a unit is from all the other units. Greater integration values are correlated with lower mean depth values and vice versa. For example, what is at the center of a circular space has the highest value of integration, and the least depth, which decreases concentrically towards the edge, while units on the edge have the same value of integration. The integration can be computed for a unit in comparison with other units at various levels of connection, that is with units aligned at the same distance with any depth value "k>0", as well as for all units in comparison with all units in the artifacts. For example, an artifact with the shape of a square has fewer integrated units than one with a circular shape, because the former has a greater average distance per unit in comparison to all the other units. Once the units have been specified by the chosen method, the measure of integration can be used to rank artifacts with the same number of units according to the effort required to move to one another (for some statistical measures of integration see Hillier 1996).

Artifacts like buildings, facilities, settlements are not simply constructions in the environment that have geometric properties and obey physical laws. Nor do they have a free-standing form in a uniform context. They have shapes that are perceived with a particular orientation to the surrounding environment as well as with a characteristic structure through which they embed the same functions differently through various ways of spatialization. Artifacts that have the same function or belong to the same typology can be compared with respect to their spatial layouts and configurational properties to understand how they constraint or promote various ways in which subjects carry out one's behavior, pursue the satisfaction of a function. Dynamic and second-order measures can be devised, which account for the flows of subjects, that is how they move, engage and communicate, and for the capabilities spatial layouts afford them. Control is a dynamic measure of the degree to which a unit becomes a place one needs to move to in order to reach the units that are immediately connected to it in comparison with all the alternative routes to them. A place with a strong control is a unit that is mostly traversed to get to its neighboring units. Choice is a dynamic measure of the likelihood that movements flow through a unit because many shortest paths that connect all spaces within a determinate distance pass through it. Any artifact can be represented along two axes of connectivity and integration. As the properties of their spatial layout vary, they acquire a determinate value of intelligibility, that is the degree to which the direct connections of some units allow one to understand the whole layout. In an artifact with a high correlation between the connectivity and integration values of its spatial units, the subjects can read the whole structure from some of its parts.

Such measures enable the theory to quantify or predict the purposive and social behavior of subjects, which is realized through locomotion and communication, by such indicators as the encounter rate, that is the density of the use of spatial units.

2. Space syntax and healthcare: spatial indicators of quality and communication

The design of the spatial layout defines the configurational properties of places that prove to be fundamental scaffolds for subjects to pursue their behavior. Appropriate design enables the subjects to understand the capabilities for actions social spaces

afford. In particular for working environments, this has a meaningful import on the natural patterns of motions that are performed to meet one another, multiplying the chances to interact and to communicate, and on spontaneously choosing where and how to select a course of action to reach one's goals. The analysis and the measures of space syntax are useful to assess the extent to which the spatial layout of artifacts being used affects subjects' behavior. Healthcare and hospital facilities have been considered test beds for the study of the impact of the network of spatial units on several dimensions of healthcare services (Haq and Young 2012). Visitors' explorative and wayfinding behavior was found to be mostly accounted for by the integration values of units. Integration is significantly correlated with the natural distribution of visitors and staff and higher values are shown by the place subjects prefer getting back to if they go astray. Lower mean depth of entrances accounts for improving exploration. The measure of integration for connection with the depth value of 3 has been found to be a good predictor of wayfinding. Some studies highlighted the relation between syntactic measures of space and inpatients' feelings and preferences. Patients prefer beds in units with lower integration and control values, because such values increase perceived privacy. However, patients with a previous experience of hospitalization prefer more integrated units, possibly weighing control and visibility against privacy.

Concerning the effects of spatial properties on the staff working behavior and its results, in the past many studies were conducted on the geometry of healthcare facilities. For example, single corridor, double corridor, circular and radial layouts were compared with respect to the location of functional units and the staff movement patterns, to derive the determinants of medical and nursing efficacy. No geometrical shape emerged as the determinant of the most efficient behavior under all the relevant respects (Sturdavant 1960; Sendler 1968; Trites *et al.* 1970; Cama 2009). Instead, syntactic measures of the configurational properties of space have been found to influence some parameters of the work of the staff that are correlated with its efficiency and the quality of outcomes. Heldrich *et al.* (2008) found that minimizing walking distances through the connection of functional areas has an effect on increasing the time health care workers spend with patients. Choudary *et al.* (2010) developed a general linear model of nurses' unplanned movements in the sub-area of the medical surgery unit to which they are assigned on a shift. The model covered average integration, average visual connectivity, and average visual depth calculated from an axial map. The model predicted the frequency of trips nurses make to patients' rooms for different spatial geometries with distances and physical resources being equal.

It is noteworthy that some studies report that syntactic measures show that configurational properties regarding visibility are significantly correlated with communication. Lu *et al.* (2009) measured the visibility of patients' beds in an intensive care unit. Thus they introduced the concept of "targeted visibility". While measures of visibility are computed for all the visible points from a given standpoint, they restricted the calculation to the targeted places of patients' beds. They showed that targeted visibility is correlated with the interaction among nurses, while general visibility is correlated with the interaction among doctors. The higher is the targeted visibility from a place, the greater is the number of nurses who gather there, where communication is more likely to take place. Communication among doctors is likely to take place where general visibility allows greater awareness of the working environment. This analysis provides the theoretical and the modelling means to treat different uses of the same functional space. However, this matter needs further research. The visibility afforded by different spatial layouts may be taken as attuned to interaction opportunities according to the stationary or the locomotory behavior of agents. Rashid *et al.* (2014) found that doctors and nurses show the same preferences for places where informal

communication takes place if measures are adjusted for movement. However, this study confirmed the influence of the configurational properties of spaces on the variance of preferences, due to the visibility characteristics they afford, regardless of size difference and despite functional similarity.

Lu *et al.* (2014) applied the measure of targeted visibility to a test case. They computed the visibility values of different target locations (patient's head, room, other regions of the facility) from given standpoints. They tested the correlation of such measures to such dimensions of healthcare efficiency and quality as the average hospitalization length, the hospital, and the intensive care unit mortality rate. They found that lower visibility values were correlated with higher mortality rates across more acute patients, while no significant difference was obtained across less severe patients.

To generalize this approach to model building, and extend the types of inpatient wards that can be compared with a multiplicative effect on the class of test cases, Pachilova and Sailer (2020) developed the Spaces for Communication Index (SCI). The measures that compose the index are: the average connectivity of paths between main functional units, developed on the basis of the measure of visual connectivity, and a factor that takes into account the times a path needs to be traversed, developed on the basis of its "accumulated connectivity" per worker, that is the number of interaction and communication opportunities each worker had while walking along that path. The index measures the visual exposure a path affords for a worker according to its connectivity, hence the chances of interaction and communication it and the places it connects give for workers. The index performed as a good predictor of the likelihood that a healthcare worker would be engaged in informal communication for a given path connecting certain functional units. The higher is the visual connectivity, the more likely is for a worker to exchange significant information about patients. Even more importantly the values of the index were found to be consistent with the ratings of healthcare quality. Wards predicted to show higher SCI values were also those with higher independent ratings of qualities, while no effect was found for ward size or number of beds.

3. Communication in place

As the SCI shows, space syntax touches upon the composite cognitive capacities underlying space and its use for communicative and social behavior. Spatial artifacts have to meet well definable requirements to allow for efficacious and successful use of their properties by the agents who communicate, act and work within them.

The configurational properties of space:

> - are decisive in carrying out purposive behavior because the visibility of the way a function is spatialized in a working environment helps subjects to satisfy it;
> - set down the conditions of agents' locomotion, hence of the perception-action cycle that subserves agents' behavior and decision making;
> - provide the interaction among agents with constraints and capabilities;
> - become an environmental factor of communication, whose importance is the greater the more it allows agents to gather and share relevant information, to hold informal, unplanned communication through which they can exchange information as activities go along.

However, spatial syntax analysis is undetermined under the respect of the perceptual and the communicative abilities that the recognition of the configurational properties assumes as given. This makes room for an improvement of the theory in which the

study of perception, communication, and their mutual interplay with spatial cognition plays a crucial role.

As regards perception, the central thread connecting the ecological theory of perception and Benedikt's first spatial syntax model may be further developed. The ecological theory rests on the tenet that perception is meaningful because of the ability to pick up the first-order and the second-order invariant properties that appear through the transformations induced by the movement of subjects and objects (Gibson 1979 is the standard reference of the model features susceptible of development; Chelkoff 2002 provides an example, albeit couched in a different conceptual framework). For such man-made environments as the spatial artifacts in which complex functions are realized like in healthcare facilities, however, the view of "directed perception" seems to be more suitable (Cutting 1986; Gepshtein and Snider 2019 review briefly the importance of the psychological and neuroscientific study of perceptual meaning for architecture). The properties of configuration at the local and the global scales present the subjects with multiple structures of equal visibility, accessibility, and permeability that correspond to multiple invariants, which subjects may select according to working tasks, needs, and to the aggregation level of their behavior. Finally, visibility and accessibility are directly linked to capabilities, yet the role obstacles and barriers play for interaction, purposive behavior and communication should not be underestimated (Lewin 1936).

As many questions arise about communication abilities. Even the SCI model overlooks such a subject matter. The model treats the issue of communication by reducing it to the likelihood of interaction measured by the encounter rate without any further specification. In general, current researches on space syntax in the healthcare domain remain vague on some crucial issues about communication. The collected data concern mainly factors like the frequency of space usage, the location of conversations, the communication duration, intensity and ease, and interaction modality. Results suggest that communication among caregivers is made easy and more frequent and also that people prefer "on-the-fly" discussions - which are short, face-to-face, impromptu and informal - rather than more formal communication such as written notes or telephone calls because this mode of communication allows staff members to turn to each other for information and decision support. However, there seems to be no data on the contents and the discursive characteristics of these face-to-face conversations "arising from the layout". We know little about the topics discussed or the role of these conversations in decision-making processes. According to Lave and Wenger,

> the role of interpersonal communication in informal, opportunistic, on-the-job learning can be understood in the context of the communities-of-practice framework, which focuses on knowledge-sharing across informal networks of people who have a common interest or task (Becker 2007: 60)

but, how these information and training resources impact on clinical staff job?

This is one of the specific questions about communication that remains to be addressed if we want to study how the configuration properties of space affect communication among health workers in the framework of Medical Humanities. Further quantitative and qualitative research is needed to explore questions such as: What model of communication is consistent with space syntax studies?; What are the topics of the conversations: specific conditions of patients, information on cases, or something else? Why do these informal conversations have positive effects on caregivers? Is it a direct or indirect effect? So, specifically, what are the *perlocutionary* effects of these informal conversations? Particularly, it would be interesting to investigate if these interactions have a positive effect on a learning level, as suggested by the research mentioned above,

or/and on relationship and emotional levels. Indeed, one may consider that the configurational properties make communicative environments, whose shape has the effects of easing tension, reducing burnout, improving satisfaction and sense of community, etc. The bottom-up research on these issues regarding communication may bring about a deep understanding of the practical influence of buildings' environment on workers and, then, on patients and visitors. This research will be crucial to understand also how communication preferences distribute over workers with different tasks, and consequently what requirements the design of healthcare environments must meet (see Trzpuc *et al.* 2010 for an application to communication among nurses).

4. Conclusion and future research

The space syntax theory provides concepts and models that may prove to be powerful at describing and predicting factors affecting working behavior, communication conduit, and healthcare delivery, which stems from the design of the experienced space. This theoretical and empirical endeavor may yield a breakthrough in Medical Humanities. It involves the research on the connection of perceptual, locomotory, and linguistic abilities subserving that kind of space cognition underlying the patterns that satisfy picking up relevant information, carrying out purposive behavior in a determinate context, and interacting and aggregating the outcome of actions and the knowledge of subjects through communication. More importantly, this research calls for a radically interdisciplinary approach, whose tools need to be specified in well-defined terms to be applied by means of standard design and analytic means. This approach is theoretically advisable to study the structure of the ordinary problems healthcare agents face (doctors, nurses, in- or outpatients, visitors), whose solution entails the use of various cognitive abilities. The research on perception and communication cannot be limited to such a decomposition that every instance of a problem is factored in sub-problems, each of which can be reduced to a determinate field of study. What seems to be a sub-problem is often the very problem of another field of study. The structure of problems in healthcare environments is what requires the composite spatial cognition assumed by the space syntax theory. One may wonder what perceptual and locomotory abilities subjects should have to exploit the contextual import of spatial meaning and to exchange relevant information "on the go" as well as what communicative abilities to grasp the clues space gives to action. For this reason, we claim that the field of Medical Humanities is interdisciplinary by constitution and needs the development we have suggested for the research on the abilities and the topics of the communication in place.

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