A study on the Healing Effects of UV- Day light for the healthy Leprosy Center through the ANOVA statistical analysis.

- Focused on 5S (Sort, Straighten, Shine, Standardize, Sustain)

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Abstract

Purpose: The aim of this paper is to reduce the stress and the disturbance occur in selective action of patient. This article will also help us to control spreading and reduce the order and bacteria produced by leprosy disease among the lepers. This will be achieved with the help of several variables and these variables help us on health benefits is 5S (Sort, Straighten, Shine, Standardize, Sustain) i.e. ratio of sectional morphology, lessor 90 degree angles, day light, universal design building and maximum ventilation. The replies from the questionnaire were collected based on varying levels of satisfaction and gloominess on the scale of 1-10. **Methods:** The multi-layer methodological framework for maximising the healing environment obtained from the observation of schemes and parameters of ANOVA: (Analysis Of Variance between five deciding factors) are. Firstly applied for the calculation of the patient's satisfaction for U.V light from sun on ECOTECT simulation, secondly the number of 90˚angle, along the corridors. Thirdly understanding the ways to represent people's perceptual structures and way finding with Space Syntax software. Fourthly the ratio of depth to height of the building typology and finally interviewing the subjects describing their spacial experiences based on scale value. The focus of this testing of human subjects was to receive data for the existence of image scheme in way-finding and to identify the mechanisms by which sun light impacts human (lepers) health. **Results:** ANOVA studies concluded that there is similarity between I and O plan as well as L and H plan whereas U plan was difference among the five selected architectural shapes. **Implications:** The purpose of this research is to show the effects of the I-type, L-type, C-type, U- type and O- type plan design, and to analyse the morphology for EBD (Evidence-Based Design) healing environment which is a universal design for Munghopir Karachi, in Pakistan.

Keywords Healing Effects, Universal Design, ANOVA Analysis, Healing Environment, EBD, Leprosy, Day Light.

1. Introduction

In 2003, there are an estimated 20,000 leprosy cases still in Pakistan and 12,000 people already disabled remain in need of care. Although the government and many NGOs are making notable efforts to improve health and hygiene. Rehabilitation aims to restore the patient and his family with dignity, leprosy in Pakistan has controlled and there is infrastructure for proper social rehabilitation of leprosy patients and their families.

1.1 Background and Objective

The building morphology i.e. I- typeC-type, L-type, U-type and O- type can provide same or even more (variable degree) level of comfort (vitamin E) for lepers' in the rehabilitation buildings as that of high energy consumption healthcare setting. While designing simple spaces for lepers it is important to have a healing environment which is

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a complementary treatment present at all five shape of rehabilitation centers (I, L, U, h, o are abbreviation devised by author as short form nomenclature specifically assigned to the building relationship with circulation layout referring to the architectural shapes specifically for this article). Here healing environment adds a therapeutic contribution to living space for the course of care for lepers. For this study the healing environment is achieved by applying Evidence based design of 5 simple strategies: sort, straightening, shine standardized and sustain for the typo- morpho-analysis. Daylight is a physical aspect for rehabilitation design it creates a soothing and healing environment for leprosy patients. This paper examines for the first time the ways for healing and soothing leprosy patients and can be increased by studying the role of building plan morphology in terms of: airiness, sun path, axial access and connectivity to the environment, i.e. demonstrating the determinants for the existing building plans of I, C, H, L and O on depth map analysis software. On one hand Pakistan is facing severe energy crises, and on the other the planet earth is going through global warming. This result in growing health issues, the only solution for both is low carbon planning. This research shows the effects of the I-type, C-type, L-type, U- type and O- type plan design, and to analyse the morphology for EBD (Evidence-Based Design) healing environment which is a universal design for Munghopir Karachi, in Pakistan.

1.2 Methods of Research

To identify the mechanisms by which sun light impacts human (lepers)[1)] health and performance and review the literature linking daylight with health outcomes in Pakistan healthcare settings. Literature suggests that adequate exposure to natural light provides a positive impact on human health and well-being of lepers patient. The rehabilitation healing centers is working as an icon for ecologically sustainable as well as healing environment and efficiently functional leprosy care center, Mhangopeer. Since this is a Rehabilitation center and is occupied all year long, all activities are conducted in all the year time (summer, winter, day and night), hence little electricity should be used, and most of the natural full spectrum light is provided from the mashrabiya and Brise Soleil.

1) Leprosy is a complex infectious disease that is caused by bacteria. It is also known as Hansen's disease.

1.3 Concept of Typo- Morphology Complex

Typo-Morpho analysis or Morpho-Typo analysis is a global methodology linking architecture, object and sign in communication and visual identity for this leprosy project. The approach focuses on typological quality. Here the crossroads of architectural typology and urban morphology, (typo-morpho) or (morpho-typo) initially defines an analytic principle describing the structuring of space, open to investigate the territory created as a Universal Design.

A three month quasi-survey was conducted, on site by the author. The patients at the rehabilitation centers were invited to participate in a questionnaire regarding the aesthetics of the rehabilitation centers in relationship to the healing and well- being amongst the patients. The study was approved by the privacy ombudsman for the research at the Lepers Rehabilitation.

Comprehensive results were obtained by using questionnaire–based interviews, field surveys data analysis and computable model to review the importance of depth and connectivity of height and width morphologies. Moreover the questionnaire replies were evaluated on the models generated on the space syntax software. The existing building plans of I-type, C-type, L-type, U- type and O- type circulation were analyzed, and the limitations, compromises and problem reductions were studied.

Key findings are the quantitative observation and opinion with the data of daylight in the ward environment with regard to vision comfort and increase of patient sleep quality. For social, physical and symbolic healing, and practical consideration, an effective design that contracts the necessity to walk long corridors and distance for supply and medication Chellas (1980).

1.4 Limitation of Previous Research

There is a gap for the universal design typo-morpho analysis though Lee Sang (2011) applied solution of Poisson Equation using iso-geometric formula which is much similar, whereas this study focuses on crystal clear concept of architectural layouts. Hardly any studies have dealt with the comparative analysis of morphological based on Karachi concept rehabilitation centers. These typologies reflect Ulrich's proposal that a view towards natural elements serves to evokes positive emotions and manage stress. This paper examines for the first time how healing and soothing leprosy patients can be increased by studying the role of building plan in terms of airiness, sun path, axial

access and connectivity to the environment. Demonstrating the determinants for the existing building plan of I, C, H, L and O on depth map analysis software.

3.2 Typo-morphological Analysis

Healing environment adds a therapeutic contribution to living space for the course of care for lepers. For this study the healing environment is achieved by applying EBD of 5 simple strategies: sort, straightening, shine standardized and sustain for the typo- morpho- analysis.

1.5 Limitation of This Research

Though typology and morphology is same but the size according to the number of patients is varying for the case study analysis.

2. Literature Review

Literature suggests that wayfinding presents people's perception Cohn (1995) and on the other hand adequate exposure to natural light provides a positive impact on human health and wellbeing of patient and medical staff in a Lepers rehabilitation environment. Leprosy, is caused by the bacteria Mycobacterium leprae, is a complex infectious disease primarily affecting the skin, nerves, and mucous membranes. The disease has erroneously been associated with biblical leprosy, which scholars believe was actually a variety of skin diseases categorized under the term leprosy. Some of these conditions could have included. It has long been known as vitamin D cured leprosy. But today, vitamin D is being hailed for being able to do much more than that. Scientists have known for some time that vitamin D helps the body to absorb calcium, in maintaining bone density, and in preventing osteoporosis. In an effort to prevent osteoporosis we have become consumers of calcium and vitamin D supplements.

Leprosy is a complex infectious disease that is caused by bacteria. It is also known as Hansen's disease.

2.1 Healing Environment

The rehabilitation centers are working as an icon for ecologically sustainable as well as healing environment and efficiently functional Lepers care center. Since these are leper's center, all activities which are conducted in the day, hence little electricity lighting is used, most of the natural full spectrum light is provided from the day light. The physiological, psychological, and behavioral effects of lighting, with the characteristics of natural light, on humans have been investigated in the fields of sleep science, human biology, psychology, and epidemiology Ulrich, R. et el. 2004. These studies indicate that neuron hormonal mechanisms regulated by the appropriate environmental lighting can result in elevated mood, arousal, and alertness, leading to increased productivity and reduced cognitive impairment. However, the effect of daylight, and the presence of windows on healthcare employees' health and performance, has not been adequately studied for Asian countries, of sub-continent; Pakistan (Table. 1).

2.2 Definition of Leprosy Center

Social rehabilitation is a serious focal point of patients in all over Pakistan, Marie Adelaide Leprosy Centre (MALC) in Karachi, Pakistan is run by Dr. Ruth Pfau, and Leprosy Patients Welfare Trust (LPWT) is the registered charitable organization under Trust Act of Pakistan. These NGO in Pakistan has established rehabilitation center for the leprosy patients and their families, where around 9000 leprosy patients and their families under psychological, economical, educational and social rehabilitation, social rehabilitation is necessary to restore them for their life with dignity.

2.3 5S Analysis Determinants

1. First determinant is concept of rational alignment of living spaces to smooth the progress of the movement of people and assist the approach.

2. To have a sense of community by connectivity of lines of sight and facilitate cone of vision; as shown in I and O site.

3. Second determinant of grid is alignment with sun path and bringing in calculated sun light, as shown case of I and O.

4. The linkages and alignment of connectivity of public and private places on the grid infrastructure protects security and prevents crime, due to visual harmony.

5. The grid facilitated expansion and amendments for the space which grow over time according to economic, social, cultural and environmental prerequisite

For this study EBD is attempted to base the building typological decisions on the Best Available Evidence with a universal design achieving the best possible outcomes for the Lepers rehabilitation space. The following morpho-types fulfill the 5S categories at varying levels as proven

on ANOVA, the 5S methodology proposed by McCullough (2010), includes the following steps though this was not specifically devised for the special case of leprosy center, yet these EBD five criterion exactly describe the 5 variables used in this paper methodological experimentation on ANOVA

• **Sort:** Clear out rarely used or unnecessary spaces (no hidden spaces achieved through the use of grids)

• **Straighten:** Organized way finding: "a place for every leper and every leper has his/ her place."

(Lesser angles, maximum one or two 90 degree or rarely 45 degrees angle in the plan form)

• **Shine:** Clear natural sun for healing, and look for ways to keep it clean. Increasing evidence also underscored the beneficial health aspects of "Day-lighting". Day lighting helps to controls lepers disease. Bacteria and viruses are naturally controlled by daylight.

• **Standardize:** Development of a system to maintain uniformity for the spaces allocated for the lepers, in terms of square footage and amount of hour's sun enters the space which is orientated according to the sun rays.

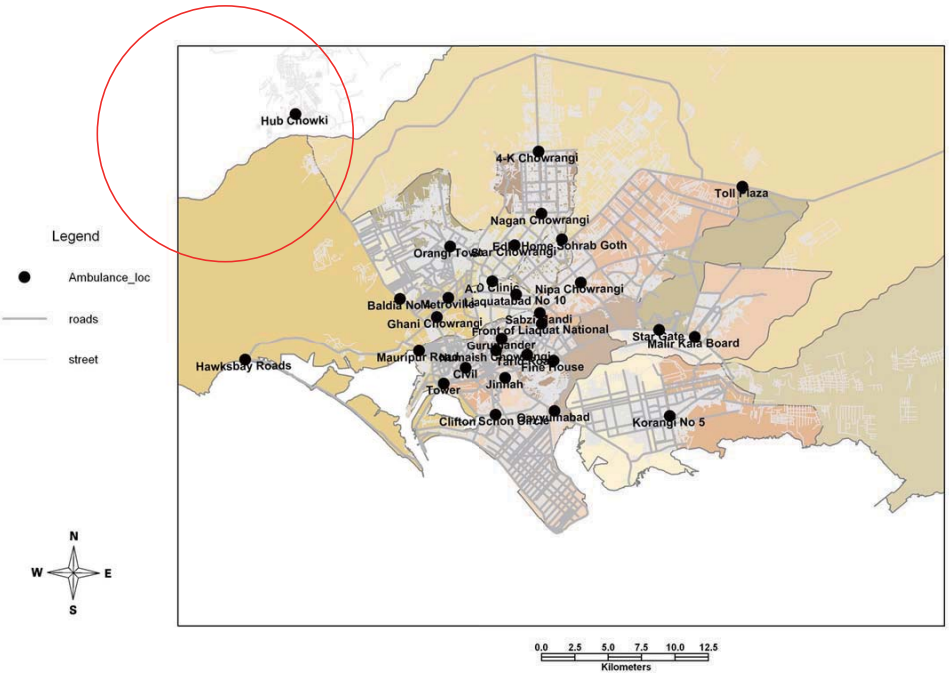
• **Sustain:** The design should be requiring lesser maintenance. Since here lepers are expected to stay for a longer time. Hence the building should be able to run with minimum regulating and maintaining requirements.

As a design process improvement tool, 5S is the easiest and quickest concept to implement. The 5S program promotes a pleasant, improved efficiency through ease of way finding. Therefore, these determinants are concepts for rational alignment of living spaces to smooth the progress of the movement of people and assist their approach. 5S also enhances a sense of community by connectivity of lines of sight and facilitating the cone of vision (as achieved for I and L plan site).

Moreover, the linkages and alignment of connectivity of public and private places on the grid infrastructure protects security and prevents crime, due to visual harmony. The grid facilitated expansion and amendments for the U and H forms which grow over time according to economic, social, cultural and environmental prerequisites.

3. Case Study

Along the Outskirts of Karachi the annual temperature remains slightly above or slightly below the thermal comfort zone that is average comfortable 25 degrees. This temperature is very comfortable and acceptable temperature for lepers. Thus, this is ideal situation for rehabilitation centers, and patients from all around Asia join these centers (designed here by several NGOs). Surprisingly, not many studies examined the role of width to depth for the typology of the healthcare building. Very few studies, have examined the effects of views on healing effects for Lepers. The O typo-morphology is a courtyard design, which won an Aga Khan Award for Architecture, Lepers Hospital, Chopda Taluka, India.



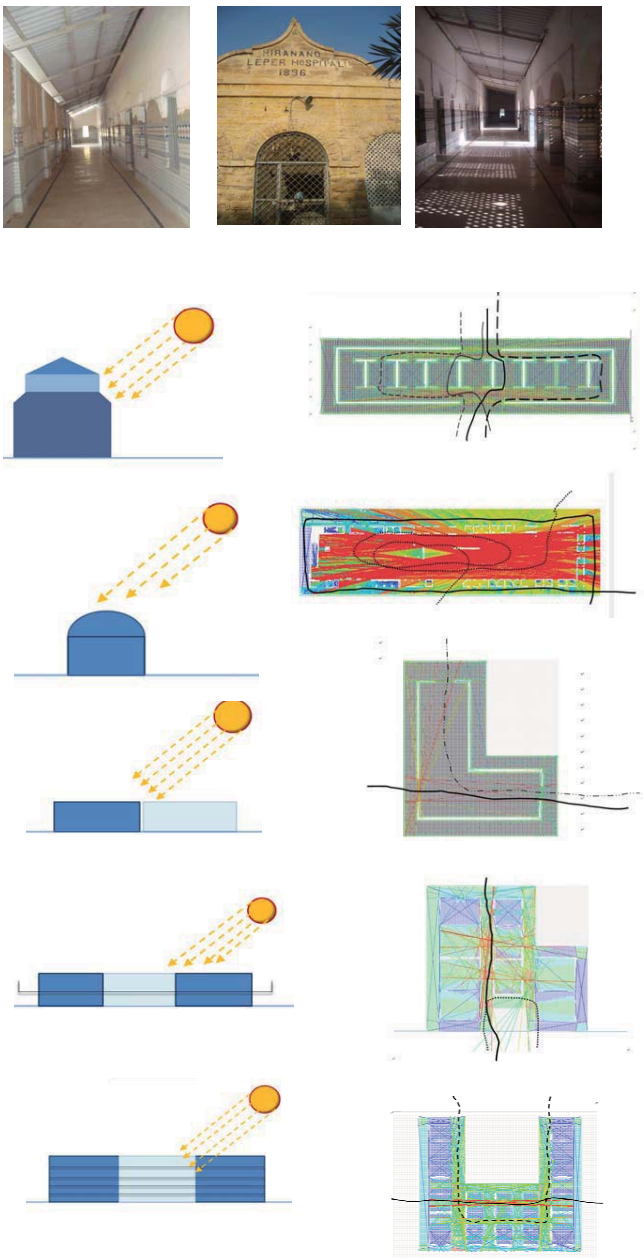
[Figure 1] shows the encircle position of suburban zone for the Lepers center

[Figure 2] Designed by architects: Per Christian Brynildsen and Jan Olav Jensen Fjellhamar, Norway. Client: Norwegian Free Evangelical Mission, India Trust Oslo, Norway, Completed:199

[Figure 3] The site plan of Manghopeer Karachi showing the simple design of the buildings

3.1 Description of Each Case

This is a very historic building 1896 I- typology with sectional ratio of 1:1 height to width, in the KMC Lepers building complex though one very calming form



[Figure 4] I- typo-morphology and O- type morphology with 1:1 height to width ratio comparison. I-Type is which is 20 bed rehabilitation center where as Chopda Rehabilitation center India is which is bigger scale as shown in Fig.2. It can accommodate 100 lepers. L- Type morphology section height to width ratio 1:2 compared with that of U- typology with 1:3 ratio H- typologies with 1:2 ratio located in KMC lepers government sector. U type planning with the width to height ratio of 1:2. Illustrates staff movement in a clinic using a spaghetti diagram.

3.2 Determinant One: Comparative Analysis of Connectivity and the Movement of People (Sort)

The depth map comparison of relationship between

lepers movement to the simple grid is analyzed in Figure .1. Physically: I, L, U, H and O are morphologies where linkages are aligned for mobility challenged individuals to interact. Functionally, these forms support: economic, social, cultural and environmental processes Frank (1992). The connectivity measures introduced here for all the cases are zones of direct access axial map. The ability of space syntax used here is to describe the relationships of part-to-whole quantitatively and syntactical accessibility, Yixiang. L, *et el* (2007) as shows in Table 1.

The connectivity and directness of utilitarian and recreational mobility challenged pupil walking for the passageway are examined in Figure 2 Raubal (1997). Here the impression produced by the simplicity of form is that every feature is pure utilitarianism. For the typologies of I. L. O. arrangement of short linear buildings residents can monitor the paths outside their lodges and open views of the pathways make the pedestrians safer (Figure. 2b, 2c).

3.3 Determinant Two: Comparative Analysis of Geometry and Changeability (Standardization)

The framework of space syntax for challenged pedestrian route within simple model is associated with lines M. Batty (2004). The unambiguous forms define location or point through straight line as Hiller. B (2012) explains: the functional nature of I, L, C precise grid corridor plan defines it as whole. Without a linear grid of I, L, O these small community shelters could eliminate all proportions of: density, controlled juxtaposition of uses, continuity and the spatial scale, order, and integration. When this is achieved by increasing the depth from 1:1 to 1:2 in case of U and H types for adjacent uses. It does not supply sufficient gentle sun light required. The replies from the patients are listed under.

[Table 1] The list of the replied from Questionnaire

I- typology with ratio 1:1=very calming form
L- typology with 1:2 ratio= nauseating (due to lack of comfortable amount of UV light)
U-typology with1:2, 1:3 ratio= inadequate from since it is rigid and a lot of 90 degree edges
H- typology with 1:2 ratio gloomy because it is tight (because of dark corridors)

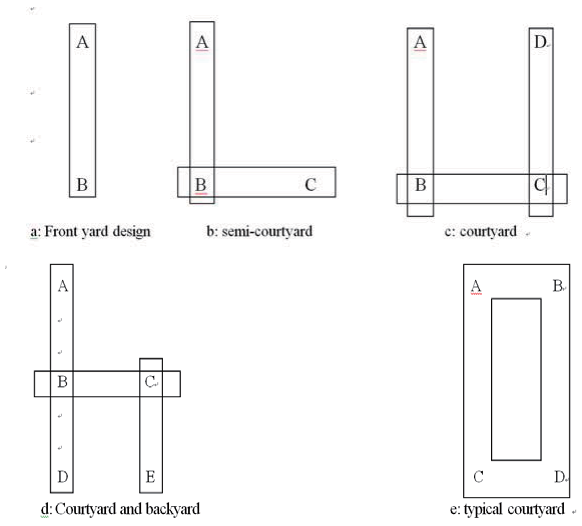
The validity of straight line which is the fundamental algorithm of the formation of the simple grid form, shown in figure two the orthogonality of the grid pattern describes the use of right angles in the layout.

To understand the geometry of connectivity as longest lines of sight (Figure. 2) the linearity of corridor invites gentle sun for most of the day. Has fewer turns and higher connectivity which is an ability to reach from one points to another as desired by inhabitants Perver K. et el. (2008).

Spaghetti Diagrams: An easy way to help patient understand flow within a department is to create a spaghetti diagram. The purpose of this tool is to identify and visualize inefficient layouts, unnecessary travel distances, and wasted time and movement for staff. To begin the process, we created a diagram of the department or floor plan. Each time a staff member makes a trip, we draw a different type of line. Typically, a single day of observation is recorded on one copy of the diagram. The number of trips taken, the travel time spent, side trips and delays are also recorded. This information forms the basis for evaluating changes. When the floor plan is completed, the clinicians to identify traffic flow.

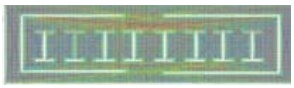
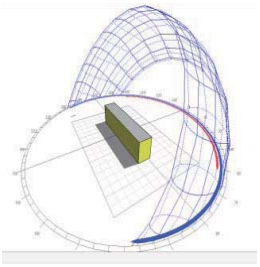
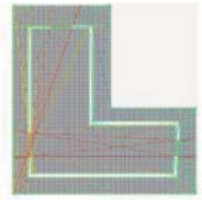
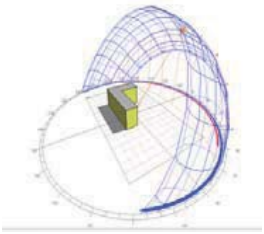
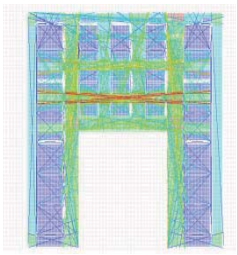
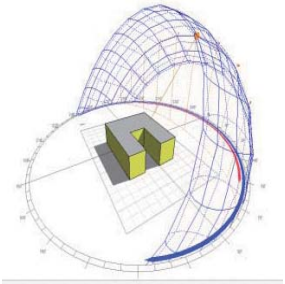
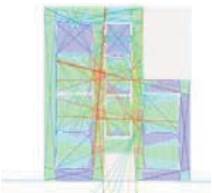
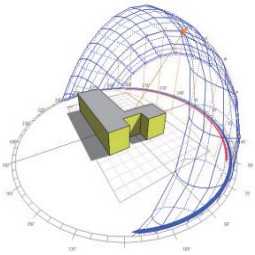
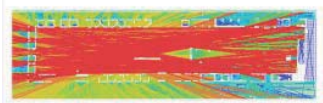
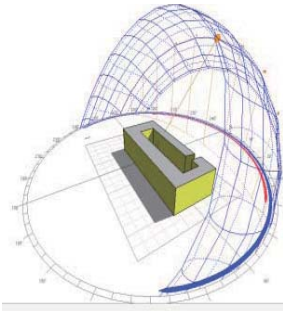
3.4 Analysis Determinant Three: I, L, C, h, o Route or Linear Strategy (Straightening)

This strategy uses point-to-point information. For example, using route or linear strategy, a person would obtain directions from point A to point B. If they needed to go farther, they would obtain directions from point B to point C, continuing in a linear fashion. This way spatial disorientation is reduced to a minimum.

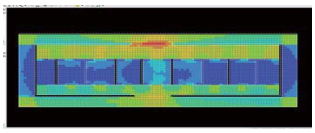
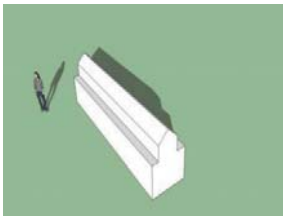
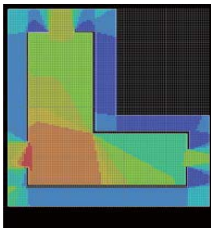
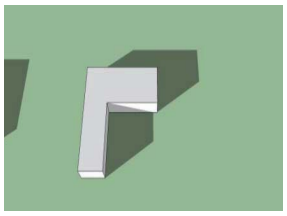
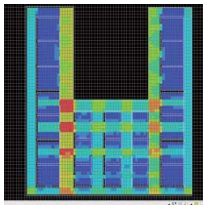
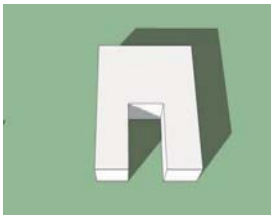
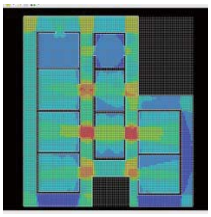
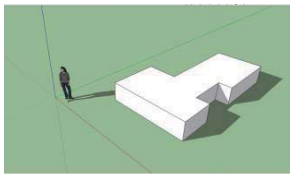
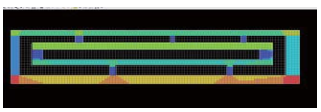
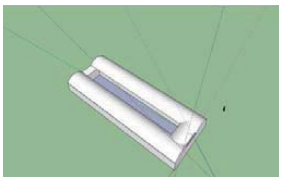


[Figure 5] Universal corridor design, simple and intuitive, this is easy to understand, regardless of user experience, knowledge or language skills.

[Table 1] Space Syntax Configuration, that provides privacy, security and safety equally available to all users.

Plan type morphology	Formal model on ECOTECT.	Photographs by Author on February 2013.	Corridor primary and secondary access way finding
I type:  KMC Lepers complex Manghopeer		 	Double loaded corridor parallel 
L- type  KMC Lepers complex Manghopeer		 	Perpendicular corridors
U- type  LPWT Manghopeer			Double parallel primary corridor with perpendicular secondary corridor 
h- type  (MALC) Karachi			One primary and two secondary corridors 
O-type  Chopda Taluka India		 	Two parallel primary corridor and two parallel secondary corridor 

[Table 2] Comparison of Four Building Types, for the Leprosy treatment by bring in nature

Plan type morphology	Formal model on ECOTECT.	Photographs by Author on February 2013.	Ratio of length to breath of the form
 KMC Lepers complex Manghopeer	I type 		1:1
 KMC Lepers complex Manghopeer	L- type 	 	1:2
 LPWT Manghopeer	U- type 	 	1:1 and 1:2
 (MALC) Karachi	h-type 	 	1:1, and 1:2
 Chopda Taluka India,	o-type 	 	1:1

The purpose is to identify what a person experiences as he or she navigates through the building, and consider how the building's features, such as long, straight corridors help or hinder the journey through and perception of the space. Providing views of the outside at the ends of corridors or full-height Mashrabia[2] or Brise-soleil[3] whenever possible help people remain cognizant of their location in the building, McCullough (2010).

3.5 Determinant Four Lighting (Shine)

Although lighting comes in two forms: artificial or natural. Natural light offers both patients and caregivers substantial health benefits, in terms of physical and mental health [6]. The rehabilitation centers for lepers "bring the outdoors inside" to create a connection with nature these simple universal shapes helps create this connection between inside and outside. Natural lighting is a key tool in creating this connection. Daylight facilitates in the body's natural circadian system, which is the innate biological clock that regulates sleep and waking and controls the daily swings in emotion, natural lighting bridges the gap between indoors and out. Natural lighting is specifically beneficial to Leprosy patients who have long hospital stay because they have the ability to look out their windows to see the time of day and observe the weather. Studies also show that natural daylight reduces depression Boyce, P. *et el* (2003). Increasing evidence also underscores the beneficial health aspects of "daylighting" interior spaces. According to R.Hobday [8] day lighting helps to control disease. Bacteria and viruses are naturally controlled by daylight. Day lit rehabilitation center have been investigated to have less bacteria and ozther health issues related to virus and infection HICPAC (Healthcare Infection Control Practices Advisory Committee, U.S. Dept. Health and Human Services, Center for Disease Control and Prevention). Day light prevent Vitamin D deficiency (which is the cause of leprosy disease), Hobday explains "because humans receive 90% of Vitamin D from sunlight, interior-centric living exposes people to less sunlight, and among the major out comes is weakening of the immune system".

2) Arabic term given to a type of projecting oriel window enclosed with carved wood latticework

3) Brise soleil, sometimes brise-soleil (breez-soh-ley, from French, "sun breaker"), in architecture refers to a variety of permanent sun-shading techniques, ranging from the simple patterned concrete walls popularized by Le Corbusier.

- Architecture design and how it can maximize the sun exposure inside the building.
- No good ventilation and designs are the cause of having health effects. Besides, uncontrolled fungal, bacterial growth in their building.

3.6 Determinant Five (Sustainability)

Firstly, a thermal zone represents an enclosed space within which the air is free to flow around and whose thermal conditions are relatively consistent. In most cases, any room that can be closed off with a door would be a separate zone. Adjacent utility spaces such as store rooms, toilets and corridors can often be grouped together into the one zone. ECOTECT is used for shading and lighting calculations, in figure two a 3D Model structure is initially created in AutoCAD from measurements of the building for analysis.

Ventilation Design: For all five rehabilitation centers Mashrabiya concept and Brisesoleil design is used to soften the rays of sun and to maximum the use of UV rays along with softening the radiation. Since, access to natural light is crucial for reducing spatial disorientation, elevating moods, and potentially reducing the amount of pain medication needed by the patient.

Hypothesis:

In null hypothesis assumed that there is no difference between typo- morphologies, while alternate hypothesis is having some variation among these typo-morphologies.

Null Hypothesis.

H0 : I=L=U=H=O

Alternate Hypothesis.

H1: I=L=U=H=O is not equal

3.7 Result and Discussion

We wants to examine the hypothesis of typo-morphological shapes of I,L,U,H and O respectively,

We collects a sample of 5 for each of the

treatments (architectural forms). Using the hypothetical data provided below, test whether the mean of typo-morphologies test is equal for each types of plane shape using α =5%.

a. I- Morphology

Group I: Number of variables = 5

8.00 9.00 9.00 10.0 10.0

Mean = 9.20
95% confidence interval for Mean: 7.962 thru 10.44
Standard Deviation =0.837
Hi=10.0 Low=8.00
Median=9.00
Average Absolute Deviation from Median=0.600

b. L-Morphology

Group L: Number of questionnaire= 5
4.00 4.00 5.00 5.00 6.00
Mean = 4.80
95% confidence interval for Mean: 3.562 thru 6.038
Standard Deviation=0.837
Hi=6.00 Low=4.00
Median=5.00
Average Absolute Deviation from Median=0.600

c. H- Morphology

Group h: Number of items= 5
2.00 3.00 4.00 6.00 8.00
Mean = 4.60
95% confidence interval for Mean: 3.362 thru 5.838
Standard Deviation=2.41
Hi=8.00Low=2.00
Median=4.00
Average Absolute Deviation from Median=1.80

d. U- morphology

Group D: Number of items= 5
2.00 2.00 2.00 3.00 3.00
Mean = 2.40
95% confidence interval for Mean: 1.162 thru 3.638
Standard Deviation=0.548
Hi=3.00 Low=2.00
Median=2.00
Average Absolute Deviation from Median=0.400

The mean for each of architectural shapes is calculated, the over-all mean is then calculated for all group architectural shapes combined.

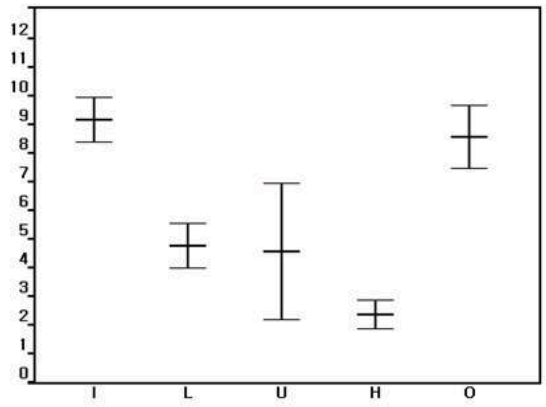
The overall mean is then calculated for all of the groups combined.

Within each group, the total deviation of each individual's score from the group mean is calculated. This is called within group variation.

Next, the deviation of each group mean from the overall mean is calculated. This is call between group variation as shown in Table number 3

Finally, an F statistic is calculated, which is the ratio of between group variation to the within group variation.

Within the group variation is significantly not different than the within group variation, then it is likely that there is a statistically no significant difference between the groups. As shown in graph 1.



Graph one ANOVA: One-way completely randomized

The graph represents that the ANOVA results for I is similar to O due to the similarities of sectional ratio and level of comfort zone, whereas L and H are similar due to presence of 90 degree angles where is U is most complex form with higher levels of variations.

Architectural forms

	I	L	U	H	O
1	8	4	2	2	7
2	9	4	3	2	8
3	9	5	4	2	9
4	10	5	6	3	9
5	10	6	8	3	10
n	5	5	5	5	5
$\bar{X}$	9.200	4.800	4.600	2.400	8.600
s	0.837	0.837	2.408	0.548	1.140
$\bar{X}_{ave}$	5.920				

source	df	SS	MS	F	P-value
treatments	4	166.640	41.660	23.6705	0.0000
error	20	35.200	1.760		
total	24	201.840			

[Table 3] ANOVA Tables

Staff members and visitor's included, terms such as confusion, dull, shabby, for the deeper area, artificial glare, little natural light, isolation physical restraints were the term used by staff to define the composite complex design basements without sun light design considerations.

4. Conclusion

In this paper we presented a formal model of wayfinding

for the challenged people in the built environment. The ANOVA model integrated five aspects for enhancing healing environment. These elements if applied to other building types could help reduce and minimize the chances for creation of Leprosy viral disease. Since Lepers are sample people which represents physically and mentally challenged people's perception and mobility problems.

The statement below best describes this paper

"The typo-morphology, I-type, L-type, U- type and O-type can provide same or even more (i.e. variable degree) level of comfort (vitamin E) for lepers' in the rehabilitation buildings as that of high energy consumption healthcare setting".

The objective for this article is to observe rehabilitation design for the dominance of evidence based design, since these centers promotes healing; the classical element on health benefits is applied here is day light. The replies from the questionnaire suggested that C or L wards, with higher ratio of length to height have contributed in stress, depression, and anxiety. Staff members and visitor's included, terms such as confusion, dull, shabby, for the deeper area, artificial glare, little natural light, isolation physical restraints were the term used by staff to define the composite complex design basements without sun light design considerations.

Therefore determinant is concept of rational alignment of living spaces to smooth the progress of the movement of people and assist their approach. To have a sense of community by connectivity of lines of sight and facilitate cone of vision; as shown in I and L plan site. Moreover the linkages and alignment of connectivity of public and private places on the grid infrastructure protects security and prevents crime, due to visual harmony. The grid facilitated expansion and amendments for the U and H forms which grow over time according to economic, social, cultural and environmental prerequisite.

- First determinant is concept of rational alignment of living spaces to smooth the progress of the movement of people and assist their approach.
- To have a sense of community by connectivity of lines of sight and facilitate cone of vision; as shown in I and O site
- Second determinant of grid is alignment with sun path and bringing in calculated sun light, as shown case of I and O.
- The linkages and alignment of connectivity of public and private places on the grid infrastructure protects security and prevents crime, due to visual harmony

The grid facilitated expansion and amendments for the city which grow over time according to economic, social, cultural and environmental prerequisite

The scholarly research in the morphological field focus on the lepers due to their varying mobility challenges and IQ- level, hence they represents a good sample population for universal design. The case of I, L and O types can well be defined site representing simple forms to navigate in an universal design built environment.

The author aims and invites other researchers to further take this research at a higher level either by applying by MANOVA which deals with more independent and dependent variables.

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