Tracing Tradition & Modernity: A Graph-Based Comparison of Housing Typologies in Khyber Pakhtunkhwa

Ar. Tariq Shah

Senior Design Architect, Eco-Tik Consultant, Peshawar, Pakistan.

Ar. Noor Badshah

CEO, Eco-Tik Consultant, Peshawar, Pakistan

Ar. Tarif Ullah

Vice Principal Architect, Eco-Tik Consultant, Peshawar, Pakistan.

Ar. Ayesha Shafiq

Practicing Architect, Peshawar, Pakistan.

Ar. Dr. Omer Shujat Bhatti (Corresponding Author)

Associate Professor, Department of Architecture, School of Architecture & Planning, UMT Lahore

omer.shujat@umt.edu.pk

ABSTRACT

Current research explorations aims to examine the parameters that have a role in achieving privacy using space arrangement and secondly the dwelling unit apparently look same but genotypically it is not same so this paper aim to analyze the internal analysis of internal space of both traditional and modern houses with the help justified access graph. The extent to which a house layout pattern determines privacy is determined following a morphological analysis of a sample of house layouts. Based on the findings, traditional house layouts are asymmetrical compared to modern house layouts and therefore offer better design solutions in regard to privacy.

Keywords: *Privacy, Space Syntax, House Layout, Justified Access Graph.*

INTRODUCTION

Houses have always been built according to the needs of their inhabitants. The spatial arrangement of house layouts may be different in different periods, regions, cultures, and societies. Societies establish their own spaces and reflect their personalities in these spaces (Shakeel et al., 2025). As time have direct effect on people behavior and thinking, as the time pass the internal function and houses typology and layouts also change according to the need of inhabitant, in general observation in late 1900s people have no concern with privacy in houses every individual love to interact and spent most of time with inhabitant of house as the time pass people get conscious about their privacy every person have first priority of their own privacy so this thought of human also reflect in architecture and function of buildings (Shah et al., 2025).

However during recent decades, unusual and unwanted alterations, which are not founded in actual needs but in some fundamental restrictions, have been applied to buildings (Bhatti et al., 2024). This trend could be dated back to the establishment of modern architecture in Pakistan particularly in 1980 and beyond thus modernization in architecture is based on the works of architects it was closely integrated with rich traditions and the quality of residential buildings was changed as well. Also, the requirements and capabilities of the inhabitants evolve over time (Baldwin and Tomita, 2007).

The space and human relations are in a mutual relationship. The morphological diversity of house plans is shown in the differences in social systems (Khan et al., 2023). The family holds the socio-economic set-up of society; it is a small unit. In order to perform this there should be a particular space, a house necessary to the family, according to their attributes and the level of privacy they desire (Sungur and Çagdas, 2003). Hence following problem statement got formulated as below:

Privacy is a topological dynamical aspect of space; it thus must be treated in a similar manner. The spaces might be classified not only based on their level of privacy, but based also on their ability to control privacy. Meanwhile, complementary approach challenges the rigid division of spaces into the domain of public and that of private. Architectural space and its different elements must, according to that view, serve as an enforcer of privacy. Space and its components must be capable of expanding or shrinking privacy based upon the personalized demands of its inhabitants. In traditional architecture in khyber Pukhtoon Khwa province of Pakistan, houses were purely based on functional designs having large courtyard in the center of house which connect the spaces in house, in courtyard all member gather and interact. Now the trend change due to modernization and houses change from open courtyard house to small units having functions.

SCOPE

The aim of this paper is to explore the morphology of contemporary and traditional home structures in the KPK region of Pakistan that influence the distribution of the interior space and the level of privacy of the rooms. The degree to which a sample of home layouts influences privacy of space is determined when a morphological analysis of the layouts of space in space syntactic theory and related methods is completed. This paper describes the house plans that provide the highest level of privacy, to what degree, and how the privacy requirements of the inhabitants may be achieved successfully.

METHODOLOGY

The data shall be collected in the form of layout plan of modern and traditional houses of Khyber pukhtoon khwa province. To be able to analyze and compare the layouts of both traditional (courtyard) and modern houses, the morphological characteristics of such layouts will be analyzed by applying a method of use, which is the justified access graph, and will simulate and model such spaces. In both space arrangements, the elementary source of information is floor plan drawings. The floor plan drawing is an architectural abstraction that describes key aspects of inside space. In addition, floor plan drawings are a valid, consistent and readily available source regarding the study (Manum, 2005).

REVIEW OF LITERATURE

Concept Of Traditional Courtyard Houses And Modern Houses

Housing is a highly strategic location in the daily life of majority of individuals in terms of the allocation of wealth control of life events, availability of social resources valuable factor in processes of social identity formation and constitution and sustenance of social relationships (Dunn, 2000). Hanson says that a house is a moving structure a house is a moving structure that expands and transforms and adapts in size and structure as the household remains in flux (Omer, 2011). An enclosed open-air space is called a courtyard house; an open space that is entirely or partially enclosed by walls or buildings, typically a portion of a castle or large houses (Aslam et al., 2024).

Some of the definitions of Courtyard is explained below:

Enclosed spaces Private open spaces with walls or buildings around them-have been used in residential buildings nearly as long as man has lived in buildings of his own. A walled or building-adjoining open space, whether in front of or in a building like a large house or a housing complex. A walled uncovered space, either all or partially enclosed by a wall, building or structure, usually a constituent of a castle or a large house (Zainab et al., 2023).
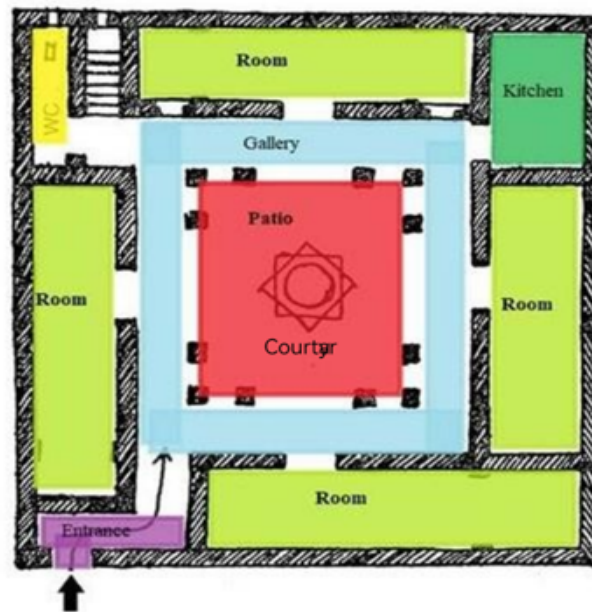

Figure 1 Typical courtyard house layout

Figure 2 Typical modern house layout

Privacy And Space Configurations

Privacy is ambiguous and indefinite (Margulis, 1977), and a definite conception is impossible, since the definite conception would be subject to reflect the ideas of a certain society at any particular time (Westin, 1970; Fischer, 1971; Kelvin 1973; Mellors, 1978). Freedom to choose seclusion, freedom to enjoy undisturbed intimacy with a group of chosen people, freedom to be anonymous to others, freedom to be safe without disclosing any personal information are some of the most common senses of this term (Forgas, 1994). One of the key features of any human culture is the privacy of people. Unless there is a reason, this privacy should not be infringed (Hanson, 2008). Separation of males and females is the term privacy in Islam. It is the separation of family members in private and public areas to keep them safe (Bhatti et al., 2025). The only interaction between males and females that Islam permits is known as mahram, that is, a member of a family, thus there is no way of getting privacy in a house except the interior space is made invisible to strangers and the spatial arrangement is made suitable to enable effective communication in the house (Naghi Zadeh, 2008). The present work is about environmental mechanisms. The environment may or may not support some behavior, thoughts, moods and so on (Rapoport and El Sayegh, 2005); this is understandable where house is the major territory to most of the people concerning day-to-day activities, privacy, social interactions and so on (Rahim and Hashim, 2012).

Space Syntax

The second perception of space is that the spatial organization is the expression of the generally shared attitudes and the ranks of their various levels (Hillier and Hanson, 1988). As far as this paper is concerned morphology is concerned with the access between rooms, the connection between spaces and the diagrams of such connections (Hanson,2001; 2003). Attention is given to access diagrams among distinct spaces in a collection of spaces. Morphology therefore, possesses a less literal and more abstract expression of the relations between spaces (Kirsan, 1996). In the analysis technique used by Hillier and Hanson (Hillier and Hanson, 1988), morphological features of a plan layout are evaluated using graphs known as justification access graphs. In these graphs, each space of the house is given depth value based on a selected space named as the carrier. The outside of the dwelling is the carrier space in the analysis. All the spaces are fitted on a horizontal line with the depth of that space being the number. The spaces with equal depth values are put on the same line. The analysis reveals that somenumeric measures referring to the properties of spatial configuration should be taken after the graphs have been drawn (see Figures 4 and 5). These measures include mean depth (MD) of space within the spatial system (house layout), the integration value of space (relative asymmetry (RA)) and the integration value of space [real RA (RRA)]. These features play an important role in identifying the level of privacy of interior spaces in the house. Integration and permeability are predictive factors to how busy a space will become or how quiet a space will become (Hanson, 2003). Space tend to be linked to one another in ways that alter the distribution of integration across the structure, rendering some spaces of a house more accessible (public spaces) than others (private spaces). These terms allow specifying the morphological characteristics of a house layout by the numerical values: symmetric-asymmetric, distributed/non distributed.

In this paper, attention is paid to the property symmetry/asymmetry since it provides material outcomes concerning the theme of privacy. Symmetry/Asymmetry is the relative intensity of space with reference to the rest of the spaces within the system (Hillier, 1993). Symmetry/Asymmetry concerns the integrating/segregating (less private/more private) influences of a space on the layout of the house. RA can be used to describe this property and its value lies between 0 and 1. A low score means that a space is likely to become part of the system as a whole and a high score means that a space is likely to become part of the space. This value is between 0 and more than 1. The lower the value the more integrated spaces and less segregation (less private/privacy) in the system, whereas the higher the value the more segregated spaces (more private/privacy) (Shoul, 1993; Sungur and Çağdaş,).

The Case And The Sample

The first question when planning to examine the level of privacy of interior space of houses in Khyber pukhtoon khwa (kpk) is what data in the form of sample of houses can be used. A total of 2 different cases have been selected to perform the analysis and comparison: a traditional house layout and a modern one between 1980-2000 (traditional type) and 2000-0nwards (modern type). The sampling plan involves the selection of 8 house plans of the two times, in five cities of kpk. Such choice is made on the basis of house plan of two styles of the way of distribution and arrangement of the interior space. In both space syntax analysis on the basis of justified permeability graphs, information is taken on the basis of floor plan drawings.

ANALYSIS

The most dominant perception of space is that the spatial organization is a manifestation of shared attitudes and the ranking of their various levels (Hillier and Hanson, 1988). In relation to this paper, morphology concerns the access between the rooms, the relationship of the spaces and the diagram of this relationship (Hanson,2001; 2003). The morphological properties of a plan layout are studied by using graphs termed as the justified access graphs in the analysis method of Hillier and Hanson (Hillier and Hanson, 1988). In such graphs, the spaces of the house have been assigned depth values based on a selected space termed as the carrier. The outer of the dwelling is the carrier space of the analysis. The spaces all the same in depth values are put on the same line. Symmetry/Asymmetry refers to integrating/segregating (less private/more private) impacts of a space with respect to the house layout. RA is able to describe this property with a range between 0 and 1. A low value specifies that a space is more likely to incorporate the system wholesale, and a high value specifies that a space is more likely to be isolated by the space. A low score suggests that a space is more likely to be inclusive of the system as a whole and a high score suggests that aspace is more likely to be isolated of the space.

The difference in the amount of space in a house plan. This value is between 0 and over 1. Based on the above-mentioned approach the analysis of the chosen sample (modern and traditional houses) is demonstrated and their justified access graph is provided.

Figures: Justified of modern house layouts
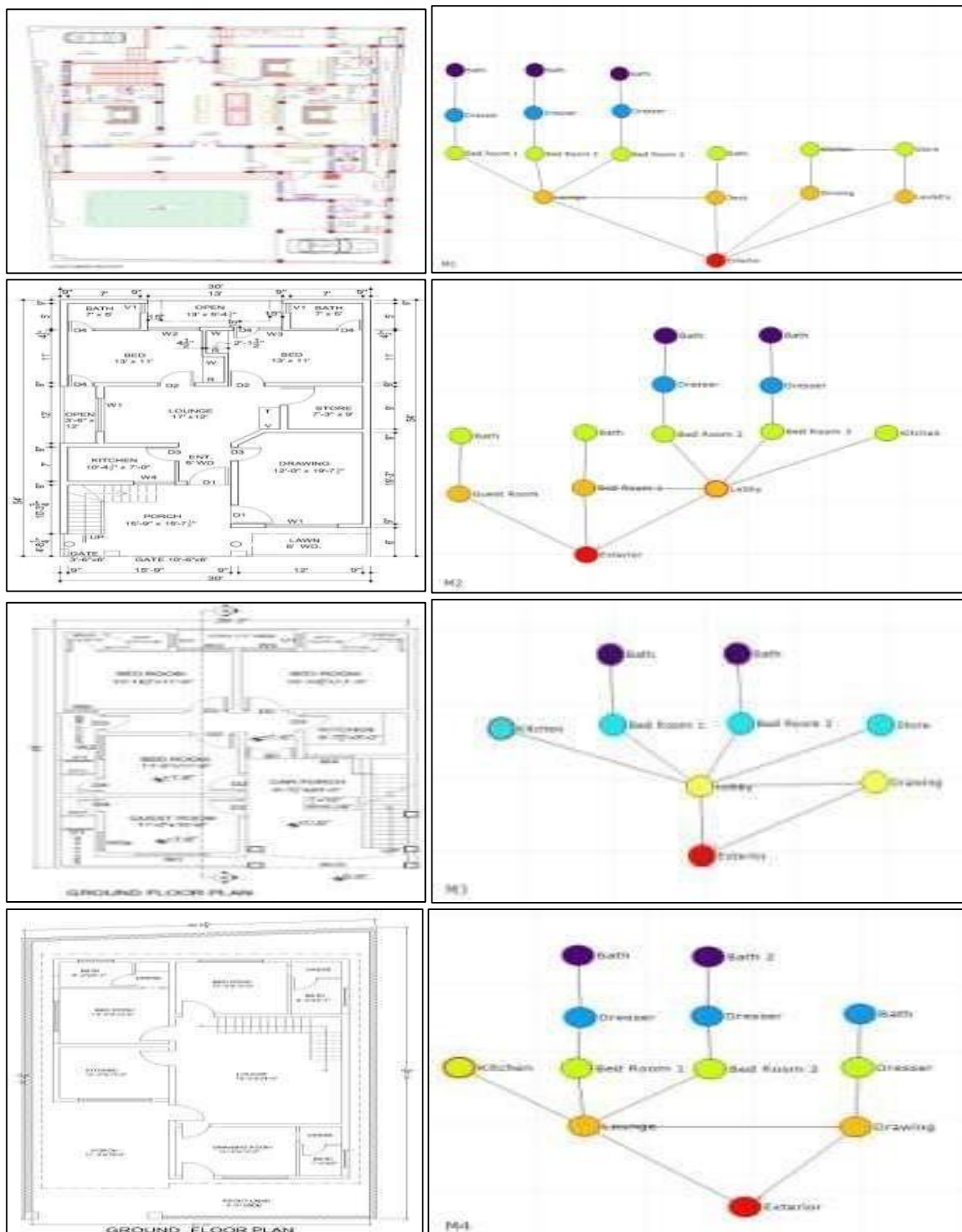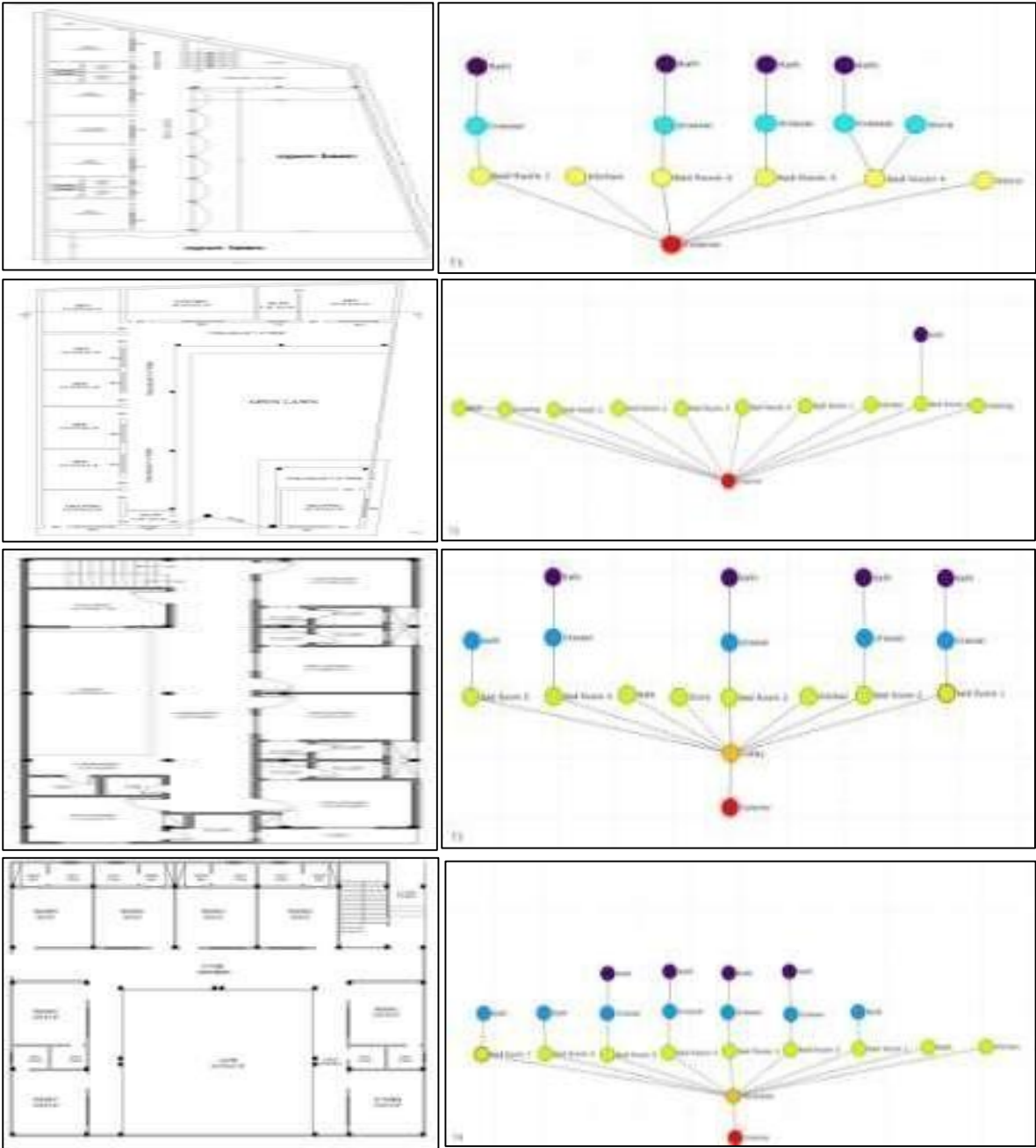

Figures :Justified traditional house layouts

Table 1. Syntactic resulted data of both traditional and modern house layouts

MODERN HOUSES			
HI	MD	RA	RRA
M1	3.28	0.30	1.01
M2	2.97	0.35	1.023
M3	2.08	0.30	1.028
M4	2.92	0.38	1.0105
MEAN	**2.812**	**O.3325**	**1.017**
TRADITIONAL HOUSES			
T1	3.18	0.31	1.004
T2	1.95	0.19	0.873

T3	3.06	0.24	0.991
T4	3.10	0.21	0.912
MEAN	**2.8225**	**O.233**	**0.945**

CONCLUSIONS

The morphological features of the house sample of both house layouts (traditional and modern) were studied. The central tendency of (RRA), the symmetry/asymmetry of layouts is 1.017 to 1.005. The mean value of (RRA) of both house layouts (traditional and modern) is over 1, indicating that the spatial layout of both is unsymmetric. Nevertheless, the traditional house layouts provide solutions to design better in terms of privacy as it possesses a higher (RRA) value with relatively higher inclination towards an asymmetrical structure than the modern house layouts. The asymmetrically structured house contains multiple control spaces, thus entry into spaces is achieved by traversing the control spaces, with the most privative spaces located in the deepest locations, specifically the bedroom spaces. The larger the mean value of (RRA), the more the movement is controlled and the level of social order is raised, and thus, the more privacy. Findings indicate that conventional house layouts provide superior design solutions in relation to privacy due to the fact that they bear greater value of real relative asymmetry as well as higher tendency toward asymmetry than modern house layouts.

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