

SPACE USE PATTERNS AND BUILDING MORPHOLOGY IN YORUBA AND BENIN

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Abstract

This paper presents a meta-analysis of three studies of traditional and contemporary dwellings from Benin City, and Ile-Ife, in South-West Nigeria. The first study investigated the relationship between activity patterns in Ile-Ife dwellings and spatial morphology, study 2 focussed on culinary related activities within the domestic space, drawn from another Ile-Ife sample, and the third study; on the spatial morphology of Benin domestic architecture, and meaning in space use. All the studies employed Space Syntax theory developed by (Hillier and Hanson 1984) for the morphological analysis. The three studies revealed some differences in space use in the two cultures despite their contiguity.

The findings include a strong continuity in space use meaning in the Benin traditional and new dwelling types, despite changes in spatial morphology; when compared to the Yoruba samples. Also, a relatively low specialization of spaces/rooms was found in the three samples, as the generic function label used to describe many spaces rarely captured the variety of activities within the key spaces. The strength of boundary between the locations of many activities and their related objects was quite fluid across the interior spaces in most of the Ile-Ife houses but to a lesser extent in the Benin sample. This was particularly evident in the distribution of culinary related activities (e.g. cooking, dishwashing).

Despite a shared (national) history, exposure to similar (external) architectural influences, and close geographical contiguity, the analysis of Yoruba and Benin architecture revealed some differences in human behaviour invested in space morphology and space use; supporting the need to integrate spatial analyses with investigations of human behaviour.

Keywords: Yoruba Architecture, Benin Architecture, Space Syntax, Activities, Meaning

Theme: Building Morphology and Performativity

1. Introduction

The three studies of traditional and contemporary domestic units samples presented here are from Benin City; the historic capital of ancient Benin Empire, and from Ile-Ife, the mythological origin of Yoruba peoples, mainly domiciled in South-West Nigeria. The studies combine morphological analysis using space syntax methodology developed by (Hillier and Hanson 1984), with investigations into space use and meaning.

The morphological analysis focuses mainly on the analyses of the 'distance' of interior spaces from the exterior in a variety of dwellings, and is presented in combination with the activity and object locations and patterns of space use. Space use is traced particularly in the relation between the location(s) of cooking as a domestic activity, and the location of culinary-related objects around the domestic space. All three studies revealed some distinct differences in space use, particularly in the orientation of the home towards the internal domain or external world, despite some morphological similarities in the samples. These on the whole, point towards a need for a study of domestic space use to focus on key domestic activities and their related objects, as several nuances in space use were also found, that provide a rich overlay on the space morphology. In other words, whilst space syntax analyses is based on the premise that the configuration of (internal) space is a direct expression of social relations, and its key focus being the ability to move from one space to another (permeability), as well as the co-presence of people within a space, further exploration of sociological phenomena is required for a strong picture of space use to continue to be developed. This also has implications for residential design in a context where the impact of the colonial experience on the trajectory of traditional architecture is still to be fully 'unpacked'.

2. Background to the study Areas

Ile-Ife town and Benin City occupy unique positions in the history and mythology of the Yoruba and Edo peoples respectively. The Yoruba peoples occupy SW Nigeria, parts of Republic of Benin and are also found in Brazil, Cuba, and Sierra Leone. Ile-Ife has a relatively stable population of about 325,000 and Benin is a city of the Edo-speaking people in a region adjacent to Yoruba Land. It is quite a traditional city and has remained so for centuries, with an estimated population of 1,147,188 in 2006. Both are significant cities within their ethnic context, hence worthy of comparison.

2.1 Background of Ile-Ife: From Traditional to Contemporary Society

Ile-Ife town is cast as the spiritual origin of all Yoruba peoples in oral traditions, and the town benefited from this 'origin' concept, which helped to preserve many traditional dwellings. The extended family typically lived on jointly owned land in compounds; called *Agbo ile*; translated as 'a flock of dwellings', and farming was the main occupation.

2.1.1 The Traditional House

The two main traditional dwelling types are a) The *Orowa house* which consists of small habitable rooms around the Orowa (central hall), and b) The *Courtyard house* with an inward focus of small rooms around a large courtyard/impluvium or a series of interconnected small courtyards commonly occupied by the chiefly ranks (see Figures 1&2). The key distinguishing feature of the Orowa house is that spaces are linked to each other, or to the Orowa space. Both the Orowa space and the Courtyard served as major activity spaces- for cooking, laundry, food preparation, eating, livestock rearing, storage, etc. The courtyard is occasionally used for

traditional/ancestral worship, and both types may include a covered front verandah which may contain graves of ancestors.

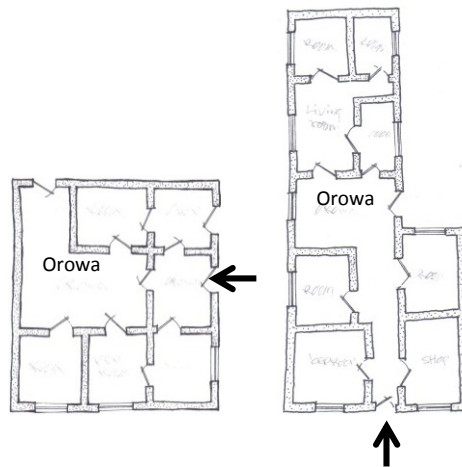


Figure 1: Typical examples of the Orowa House
(Source: Adeokun 2007 fieldwork)

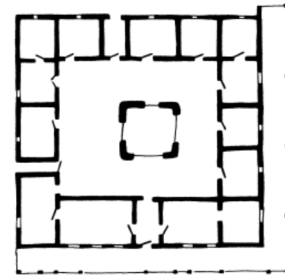


Figure 2: Example of a basic Courtyard House
(Source: Vlach 1984)



Figure 3: Examples of facades of Orowa Houses
(Source: Adeokun 2007 and Ekundayo 2007)

In both types, the toilet facilities (pit latrine) and shower areas are separate from the main dwelling, and the bedroom is the only real 'personal' space available to the family, and tended to be small. The combination of small rooms around a large communal space (Orowa or Courtyard) draws members of the extended family into prolonged daily contact.

2.1.2 The Modern Flats and Houses

The newer dwellings developed from 1940's onwards include multi-family tenements (rooming houses) shared by unrelated households, self-contained flats, semi-detached and detached houses. The tenement is usually on two levels, and typically comprised of six to ten habitable rooms arranged on both sides of a central corridor. The service spaces are usually on a secondary corridor at the back or in separate outhouses (refer to Figures 4). The self-contained single household modern flats and houses usually comprised of reception spaces grouped together and linked by corridor to the sleeping area (see Figures 5, 6 & 7). The sleeping area is usually on the upper floor when the house is on two floors, and the bathrooms are usually in the sleeping area but a guest toilet may be included in the living area downstairs.



Figure 4: Example of floor plan and façade of a Tenement house. (Source: Adekun 2007)



Figure 5: Example of a Modern flat (Source: Adekun 2007)

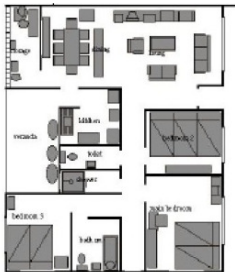


Figure 6: Example of a Semi-detached house plan (Source: Adekun 2007)

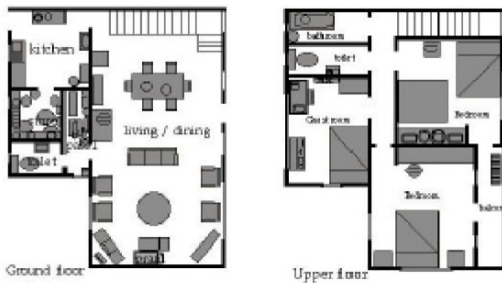


Figure 7: Example of a 2-Storey house plan and sample façade of a 2-Storey house (Source: Adekun 2007)

2.1.2.1 External Influences: -

Initially, the main influences for the newer domestic plans, were the 'Brazilian' house influenced by the two-storey Brazilian *sobrado* or one-storey *terreo* (see Figure 8) introduced by ex-slaves from Brazil back in the mid-19th Century, which spread to Ile-Ife from Lagos, and the 'Colonial' houses and the estate model of the Government Reservation Areas (GRAs) developed by the British government. According to (Vlach 1984), the 'Brazilian' house was typified by ornamentation to doorways and windows, with features such as columns, balconies, verandas, and bright colours, and influenced the traditional Yoruba plans via its two-storey house model referred to as *Ile-petesi* or 'upstair house'. The Brazilian house plans in Nigeria have a central hallway flanked by rooms on both sides. Alternatively, one of the front rooms was replaced with a veranda (Figure 9).

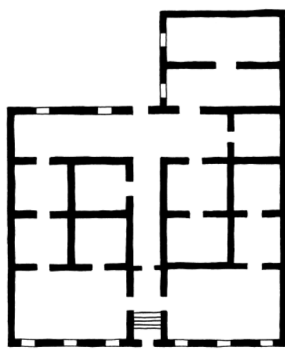


Figure 8: A Sobrado house from Brazil
Figures 8-10: Vlach 1984)

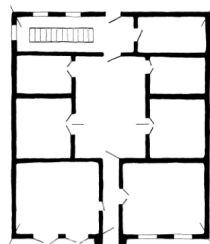


Figure 9: Brazilian House built in Ile-Ife (1927)

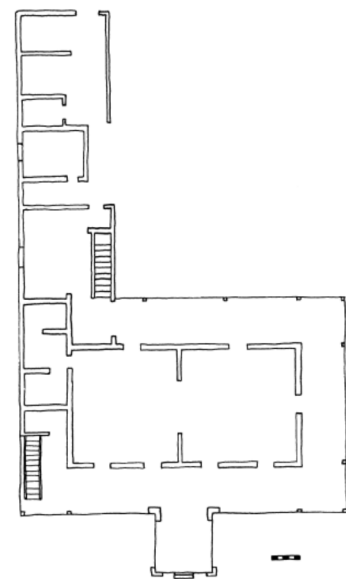


Figure 10: Colonial House (Source of

The spread of Christianity and monogamy, and the emergence of the merchant class helped increase the popularity of the Brazilian house to satisfy increased individuality amongst the wealthy, and also with poorer people who adopted the central hallway and very modest use of ornamentation (Vlach 1984, 18). Though the British colonial houses were also two-storeys high (Figure 10) with vertical separation of public and private areas, the Brazilian house was more attractive because its arrangement of rooms around a central space was not dissimilar to the Orowa house. The 'upstair' house also became popular with the new breed of property developers for the tenement dwelling type in response to a growing lower-income rental market.

2.2 Background of Benin-City: - From Traditional to Contemporary Society

Benin City is a "traditional city" typified by a closed system in which customs, traditions and cultural values and beliefs are held in high esteem, popular for its bronze sculptures, arts and craft, and is reputed to have one of the oldest sustained monarchies in the world (Atedhor, et al. 2011). The hierarchical ladder in Benin has the Oba as the spiritual/temporal head, and the administrative agencies are tied up with structured chieftaincy and guild systems (Ndubuisi 2006), several of whom resided within the palace grounds prior to the British expedition in 1897,

though the guilds were made to spread out after the expedition due in part to palace reduction. A study carried out in 1994-95 identified four residential zones in the city: The Core Area, Intermediate Area, Suburban Area and planned estate Settlement Area (Ogu 2000), radiating out from the core area to the planned settlements on the outskirts.

The core and intermediate residential areas of Benin have the oldest architecture/residential spaces. The core area is assigned to royal families with the Oba's Palace, located at the king's square which connects all major roads to other parts of the city. Today, it is the administrative hub of the state within which Benin is located (Onokerhoraye1984). The intermediate residential area encloses the outer wall and accommodates six of the *Uzamas'* (Traditional Chiefs), the Queen Mother (i.e. seventh member of the *Uzama*), the *Edaiken*, (i.e. the heir-apparent), the government reservation area, and other government housing quarters. The suburban area and planned estates area include the government civil servants estate, private and public estates, and other institutions outside the city wall. The houses surveyed were grouped into three broad categories: the traditional courtyard house (*Oto-Eghodo*), the common corridor/apartment houses and the contemporary houses; and are introduced below.

2.2.1 The Traditional Courtyard House ("*Oto Eghodo*")

The "*Oto Eghodo*" house is divided into a front section which is the male domain and back section which is the female domain (Aisien 2001). The cooking and eating section has a kitchen both inside and outside the main house, and the sleeping section is organized such that bedrooms are on different levels and arranged around courtyards. The personal hygiene section (toilets, shower area) is at the back, as it is the most un-hygienic space in the compound. The outdoor/guest section is very large and used very regularly. There is usually a separate section for women, covering harem, menstruation room, storage of household goods and the cooking area (kitchen) shown in Figure 11.

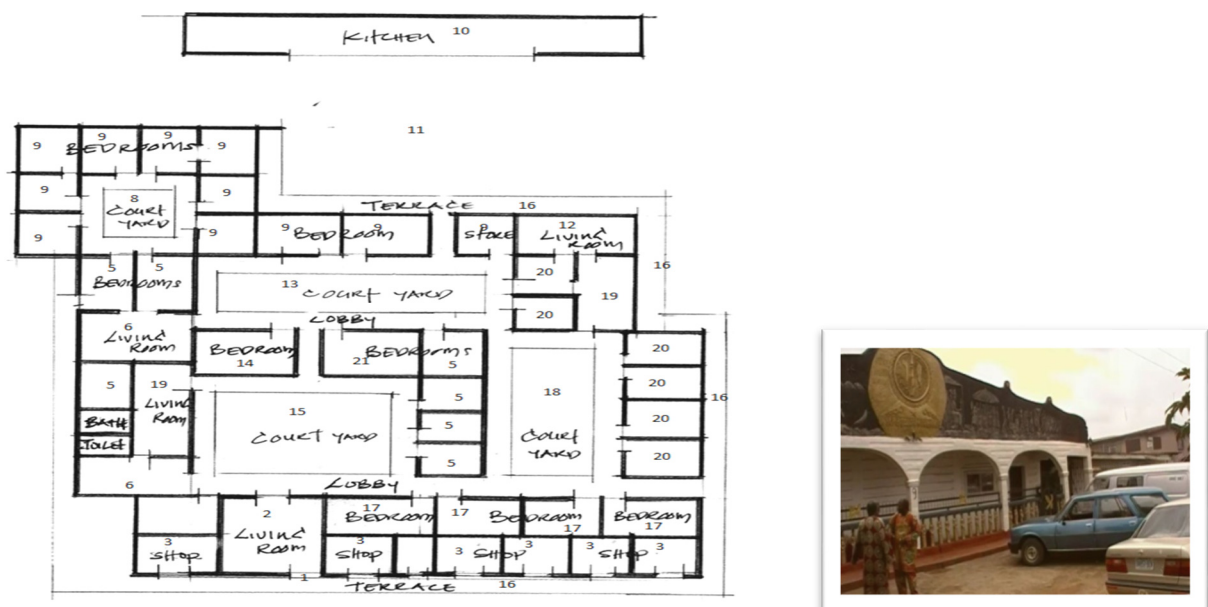


Figure 11: Plan of a Typical Family Compound Courtyard House and example of a courtyard house façade (Source: Ekhaese 2011)

2.2.2 The Common Corridor House and Apartment House

The cooking, eating and household goods storage section is very important in the Benin corridor/apartment setting. The personal hygiene section is located both outside and inside the main house as shown in Figure 12 and 13. The entrance leads to a space for receiving visitors, ceremonies and relaxation. The Outdoor/guest section consists of terraces and balconies, guestroom and living room. The worship section in the traditional house is transformed into the prayer altar, while socializing, ceremonies occur in open spaces or large halls where available in the common corridor and apartment houses (see Figure 12). The Benin common corridor house has habitable rooms on both sides of a central corridor, with kitchens, toilets and bathrooms on a secondary corridor/courtyard to the rear of the building (see Figure 13). This is very similar to the Ile-Ife Tenement House, and both typically called the 'face-me-l-face-you' house.

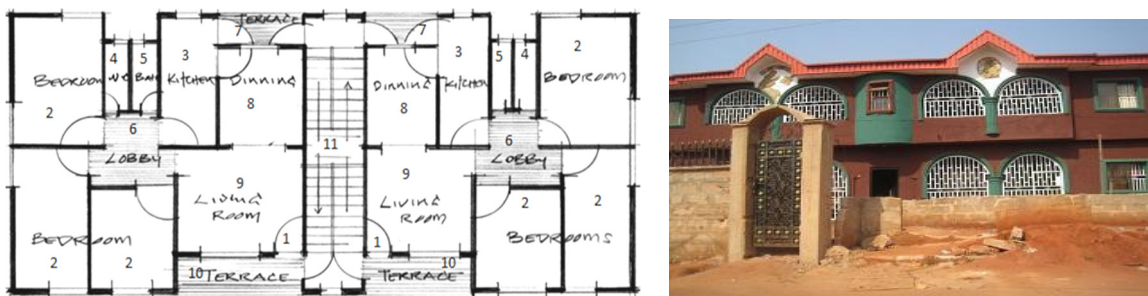


Figure 12: Plan and façade of a Semi-Detached 2-storey House (Source: Ekhaese 2011)

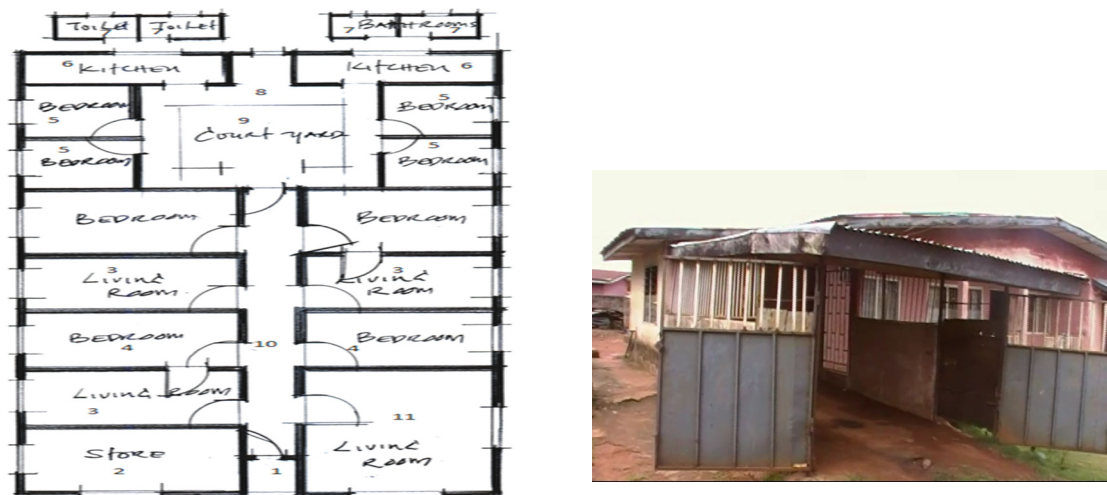


Figure 13: Plan of a Common Corridor House and a typical façade (Source: Ekhaese 2011)

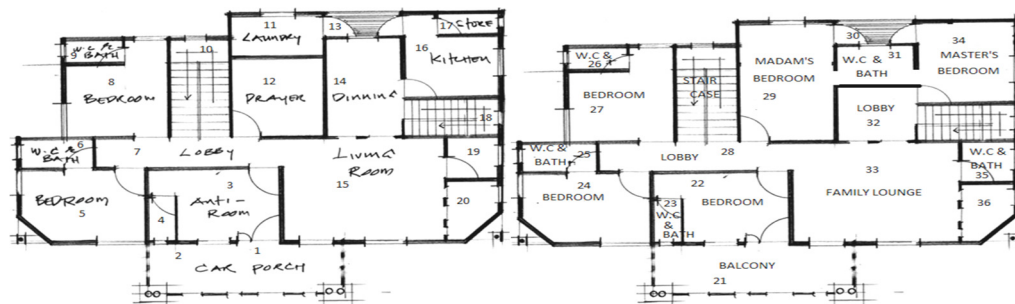
2.2.3 The Contemporary House

Contemporary Benin domestic houses are either detached or semi-detached, and the reception spaces (living room, dining) are separated by a lobby or corridor from the sleeping section. The personal hygiene section has new meaning with additional visitors' convenience located inside the main house, very often as an en-suite bedroom including a laundry. The outdoor/guest section has additional spaces such as halls, ante-room, "sit out" and car porch organized to receive guests in the entrance section. The outdoor section is typically well defined

with well-trimmed grass, flowers beds and shrubs. Worship, socializing, ceremonies and festival are done in the prayer room, the mini-chapel and outdoor garden. (see Figure 14 and 15).



Figure 14: Plan of a Typical Bungalow (Source: Ekhaese 2011)



Ground Floor

First Floor

Figure 15: Plan of a 2-storey Detached house (Source: Ekhaese 2011)

3. Research Methodology- Space Syntax theory and Sociological Analysis

The uniqueness of Space syntax theory is that it recognises space configuration as possessing built-in social and contextual meaning however, the studies presented here also focus on space use, meaning because the physical and social realms are intertwined in quite complex ways. (Hodder 1987), (Kent 1990), (Rapoport 1990), (Chapman and Hockey 1999), and (Miller 2001) have all laid similar emphases on the need to study this interaction between the domestic space and space use, and for (Lefebvre 1974, 1991) there is no real separation between physical, social and mental space in reality. In essence the physical space is a place of negotiations of social relations (social space) as well as a space of navigation for activities (Tversky 2003). The context is certainly of importance in analysing meanings attached to domestic objects and activities, stated in (Adeokun 2012) which according to (Oldmeadow et al 2003), is influenced by the desire for status, and group membership. In summary, social space exists always in tandem with physical space.

3.1 Space Syntax theory and the Justified Graph

The main measure that this study concentrates on from the Space syntax 'palette' is the measure of permeability as expressed in the Justified Accessibility Graph (or J-Graph). Both generic types of graphs that tend to occur- the 'tree' graph consisting of spaces with no alternative means of exit except through the original access, and the 'ring' graph with alternative means of exit or access to a space- were found in all three samples (see Figure 16 and 17 J-graphs). (Hillier 1996) summarised that every space in a J-graph would fall under one of four types of categories based on their connections as follows:

Type-A spaces are terminal or dead-end spaces, space. Type-B spaces are transitional, forming part of a sequence leading to other spaces, Type-C spaces are part of ring sequence, and Type-D spaces lie on two or more rings. These categories affect the possible uses to which a space can be put, depending on the desired level of accessibility.

The following spatial properties were identified in the J-graphs of the sampled dwellings: - Symmetry and Asymmetry, Depth, Distributedness and Non-Distributedness, and Connectivity and Control. Symmetry occurs when spaces bear identical reciprocal relationships to each other, and no space unilaterally controls access to any other space, while asymmetry occurs when a particular space must be traversed in order to gain access to a third space. Distributedness assesses if there is a ring, indicating alternative routes and Non-distributedness, a single sequence of spaces. Connectivity measures how many spaces are linked to any particular space and Control measures how well a particular space permits or restricts accessibility to other spaces within the overall system.

3.1.1 Space syntax (J-graphs and the Ile-Ife Domestic space and Kitchens studies)

The process of abstracting the convex map in the Ile-Ife studies involved a few modifications to (Hillier and Hanson 1984) definition of a convex space as any cell/space label that is fully bounded by walls and encloses all the surface area that may be connected by any two points within the cell. In the Kitchens study, the outside spaces were mapped as distinct spaces; indicating the backyard, side yards, and front yards as separate convex spaces, due to the different uses found in them. Just like (Goffman 1959) analogy of the front stage and backstage of a theatre in relation to domestic space; the front-facing front yard is usually the presentable façade of the home, and the backyard contains utility spaces such as the kitchen, bathroom, toilets, etc. As such, in the justified graphs, the front yard is the reference point for the graph, and indicated with a circle and a cross. All other outdoor spaces are considered separately as backyard or side yards, and are indicated with a square. The area used for ceremonial cooking is indicated on the site plan (see Figure 16).

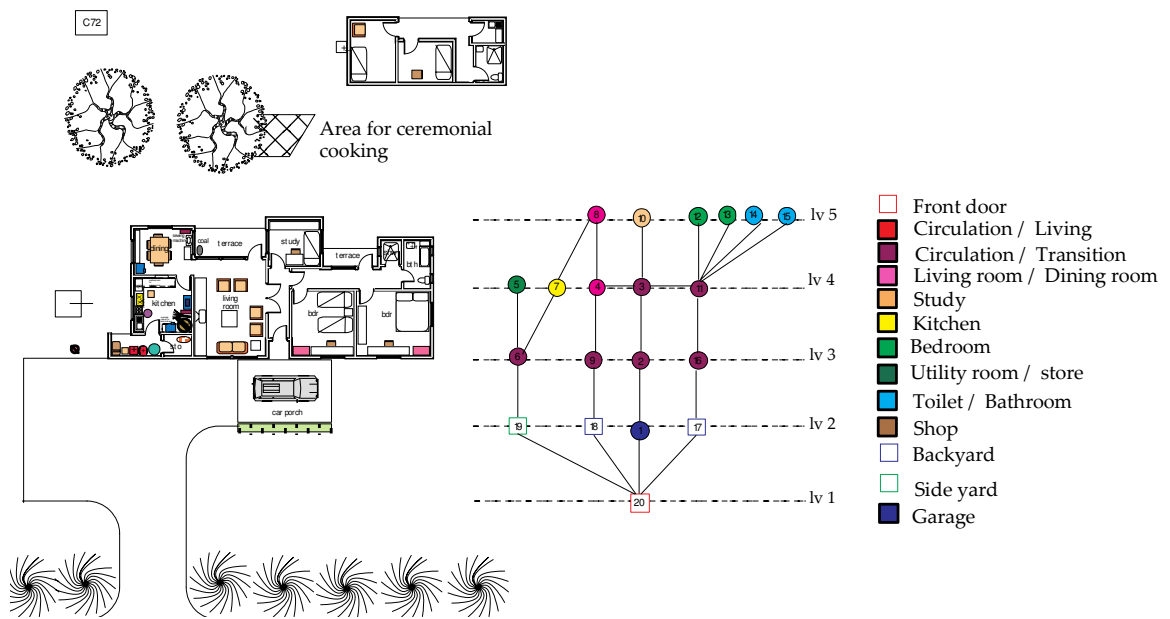


Figure 16: Floor plan of a modern detached house and j-graph mapped with space labels (Source: Ekundayo 2007)

In the Domestic Space study; where two main functions were identified within a space that also showed distinct spatial separation, the two were mapped as two convex spaces. The example below demonstrates this adjustment, and mainly occurred in floor plans where the living area and dining area were in an L-shaped space (and modelled as two convex spaces) (see Figure 17), and in a few instances where the Orowa was in a L-shaped space.

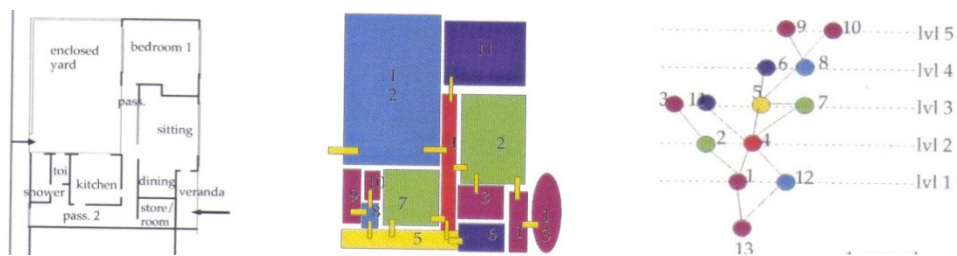


Figure 17: Example of plan with the living and dining areas represented as two distinct convex spaces. (Source: Adeokun 2007)

3.1.2 Space Syntax (J-graphs and the Benin Sample)

The three house types from the Benin sample are analysed using J-graphs as described below. All similar spaces (e.g. bedrooms) were represented by the same number on the J-graphs; a departure from the standard practice within the space syntax tradition, but one that does not obscure the analysis of step depth. (Figure 18 and 19). This same process of modelling the J-graph was also utilised for the common corridor house, the apartments, and the contemporary houses.

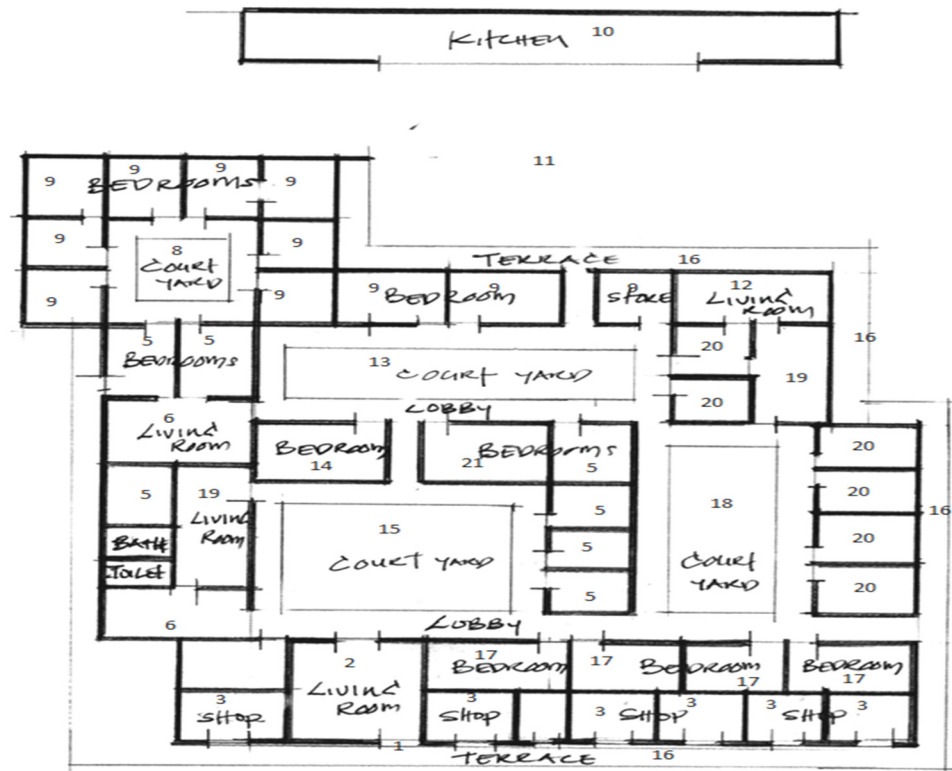


Figure 18: Floor Plan of a Typical Family Compound Courtyard House (Source: Ekhaese 2011)

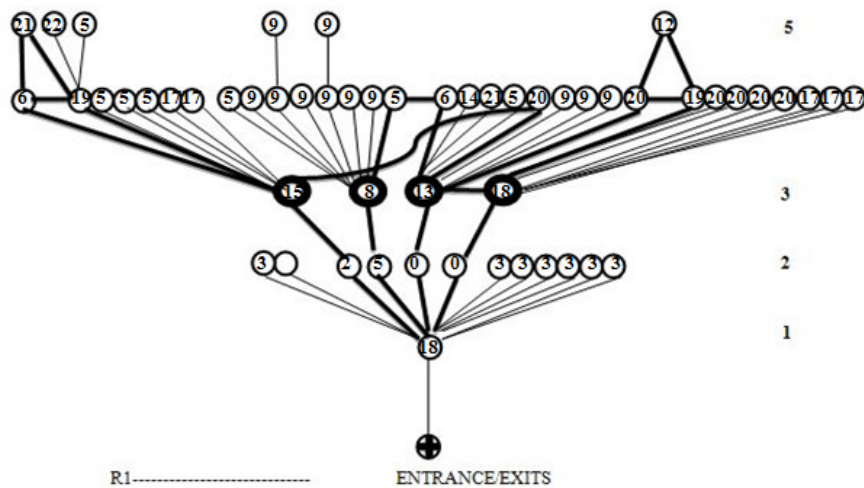


Figure 19: Justified Graph of a Typical Family Compound Courtyard House (Oto Eghodo) (Source: Ekhaese 2011)

3.2 Questionnaire Design in the Ile-Ife and Benin Studies

All three studies involved the use of questionnaires either administered as a structured interview, or completed by the respondents, that delved into space use, meaning and socio-economic characteristics of the households. In the Domestic Space study, four areas in Ile-Ife were surveyed; the traditional town core (Enuwa), a working class tenement

neighbourhood, a group of private middle class estates, and the University campus housing. 40 households were surveyed in each area. The Kitchens study focussed on kitchens in the domestic space, and studied 25 households each from three of the four areas surveyed in the first study. The Benin study involved the administration of a questionnaire to 1141 households, focussing on domestic activities and meaning attached to the interior spaces.

4. Case Study Presentation: The Ile-Ife and Benin Studies

4.1 Ile-Ife Houses and space syntax characteristics

6 main genotypes were identified from the domestic space analysis of 126 distinct floor plans, while 7 genotypes were identified from the kitchens study of 75 houses. The two studies identified similar genotypes that seemed typical of the town. The three most typical genotypes are presented below. The Orowa genotype (Figure 1) was found mainly in the Old Enuwa traditional town core sample of Orowa Houses. This genotype was typified by shallow depth, and was the shallowest genotype in both Ile-Ife studies (mean overall depth = 3.588). The multifunctional Orowa space proved to be the most integrated space in the house, and vital to life in the traditional area. The Orowa genotype is identified as follows:

Orowa space (integrated) > Parlour > Bedroom > Kitchen > Shower room (segregated).

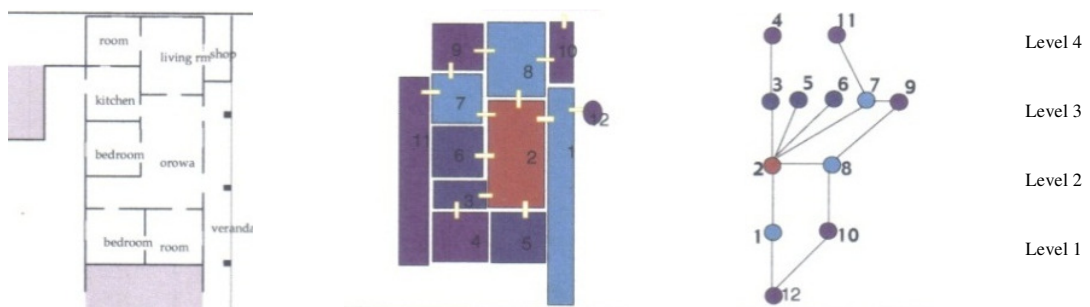


Figure 20: Space Syntax analysis of Orowa Genotype (source: Adeokun 2007)

The Double Loaded Corridor genotype which had a very segregated kitchen, also referred to as the DL-Corridor (segregated kitchen) genotype was the most commonly expressed genotype in the tenement/rooming house floor plans in found in both Ile-Ife studies. This genotype was deeper than the Orowa genotype, but not as deep as the genotypes found in the modern houses and flats of the middle class estates and University Campus housing. The DL-Corridor (segregated kitchen) genotype is defined as follows:

Corridor (most integrated) > Parlour > Bedroom > Kitchen > Shower room (segregated)
 Examples of this genotype is shown in Figure 21, and its mean overall depth = 4.308.



Figure 21: Example of DL-Corridor (segregated kitchen) Genotype (Source: Adekun 2007)

The genotypes most typical of the modern flats and houses were a) the Single Corridor genotype (the SL-Corridor genotype) and b) the Living room Genotype. Both were defined by either a highly integrated Living room or Corridor. The corridor often linked the bedroom area to the living area. Both genotypes had well integrated corridors and living rooms, and segregated bathrooms. This paper concentrates on the Living room genotype, but both modern genotypes are deeper than the genotypes found in the Enuwa area and the working class tenement neighbourhood (with mean overall depths of 4.400 and 5.429 respectively).

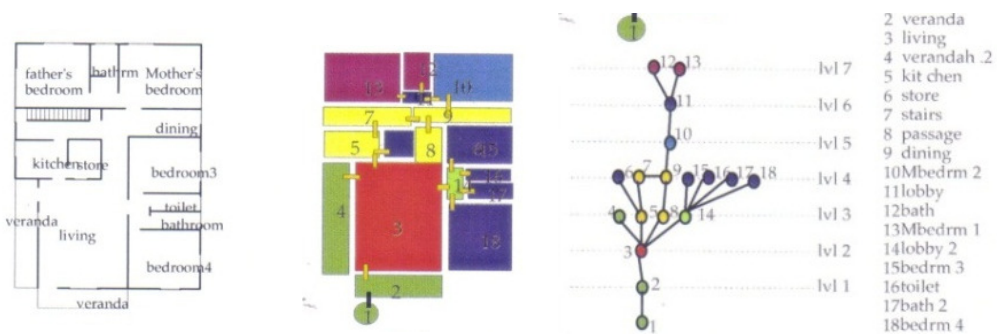


Figure 22: Example of Living room Genotype (Source: Adekun 2007)

1. Living room Genotype:

Living room (most integrated) > Corridor > Kitchen > Bedroom > Bathroom (segregated)

2. SL-Corridor genotype:

Corridor (most integrated) > Living room > Kitchen > Bedroom > Bathroom (segregated)

The genotype common to the tenements -(DL-Corridor (segregated kitchen) type)- was the ‘ringiest’, because it typically has a major ring which links the upper and lower floors to the outside, and often had communicating doors linking a set of rooms as shown above. The Orowa genotype was less ringy (see Table 1) with a mid-range proportion of C and D-spaces (28.9%), while the Living room genotype had the lowest proportion of C and D-spaces (18.8%).

Table 1: Genotypes and mean number of rings, and percentage of C and D-spaces

Genotypes	Mean number of rings	% of C and D-spaces
Living room type	0.571	18.8%
Orowa genotype.	1	28.9%
DL-Corridor (all segregated function spaces) type	1.571	25.5%
SL-Corridor type	1.769	35.6%
DL-Corridor (integrated kitchen) type	2.357	25.2%
DL-Corridor (segregated kitchen) type	2.467	32.4%

Source: adapted from Adeokun 2007

4.1.1 Ile-ife genotypes and Space typology

The dead-end status of the bedroom is almost unchanged across the genotypes but, the living room and kitchen showed a shift from dead-end spaces (Type A-space) in the traditional genotypes to being on rings (Type C and D-spaces) in the modern ones. The shallowness of the Orowa space is replaced by the relatively shallow Corridor in the modern genotypes. The bedrooms, toilets, and bathroom are consistently deep in all genotypes (apart from the guest toilets in the modern units) and the corridors are shallow across board. The living room and the kitchen however are slightly shallower in the modern types, pointing towards a change in their roles in the everyday life. A relatively shallow depth of all interior spaces from the exterior was noted in the traditional types which is consistent with the fact that several activities are conducted outdoors, but the exterior is more segregated in the modern types, corresponding with its slightly less intense use for activities. An increase in transition spaces was also found in the modern types which helped to enhance the separation of the living, service and sleeping sectors.

New space labels emerged in the newer genotypes and the traditional Orowa disappeared from the modern genotypes. As such, several activities that used to occur in the orowa were displaced to the living room & corridor in the modern types. While some activities have become deeper in the modern genotypes (e.g. sleeping), a few have become shallower. A significant number of activities and objects were found in many spaces in each plan, whilst only a few activities and objects were restricted to just one or two spaces in all genotypes, but cooking however occurred in slightly fewer locations in the modern genotypes.

4.1.2 Ile-ife Genotypes and Culinary Activities

Figure 23 shows the Orowa genotype, the DL-Corridor genotype and the modern house genotypes occupied by wealthier nuclear family households with the focus on the kitchens and the outdoor spaces. In each plan, the designated kitchen is marked in red, the multi-functional space that is also used for culinary activity in blue.

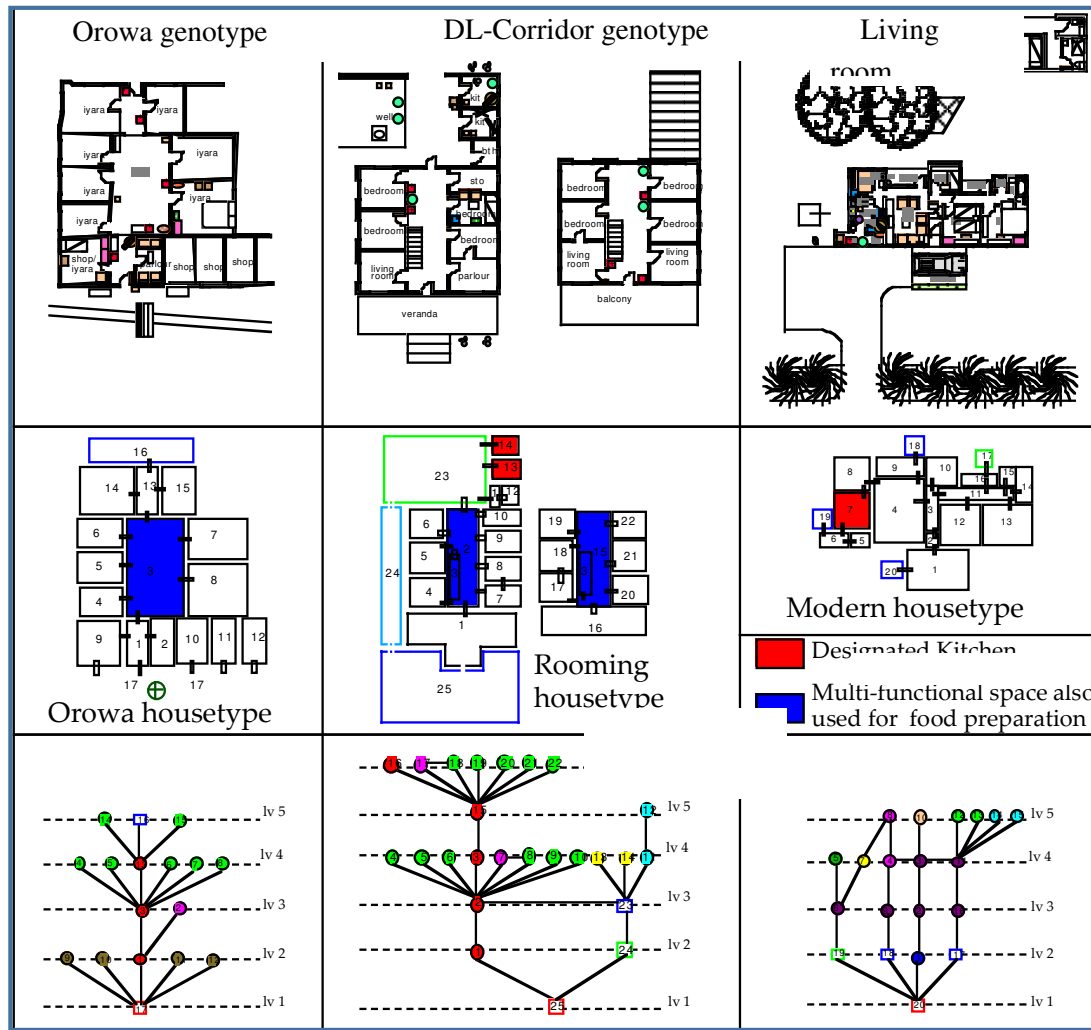


Figure 23: Three Genotypes with their space mapping and j-graphs (Adapted from Ekundayo 2007).

Architects trained in the Western tradition are familiar with the culinary work triangle as the circulation between the sink, the fridge and the cooker, which corresponds to the source of water, storage of food and the source of heat respectively. However, in this study, the kitchen has been broken down into its constituent components of space, activity, objects and food.

These elements are mapped onto the j-graphs for the house to indicate how extensive the culinary footprints travel from the cooking spot. The exact location of culinary related activities, objects and food were mapped on the j-graphs to measure the step distance of these culinary-related activities and objects from the main cooking space, and the strength of the 'kitchen' boundary between them (See Figure 24).

- Space: the source of heat, water and storage
- Activity: cooking, eating, dishwashing, food-processing and ceremonial cooking.
- Object: traditional equipment, electronic appliances, implements and facilities.
- Food: raw and cooked foods, indigenous and import foods.

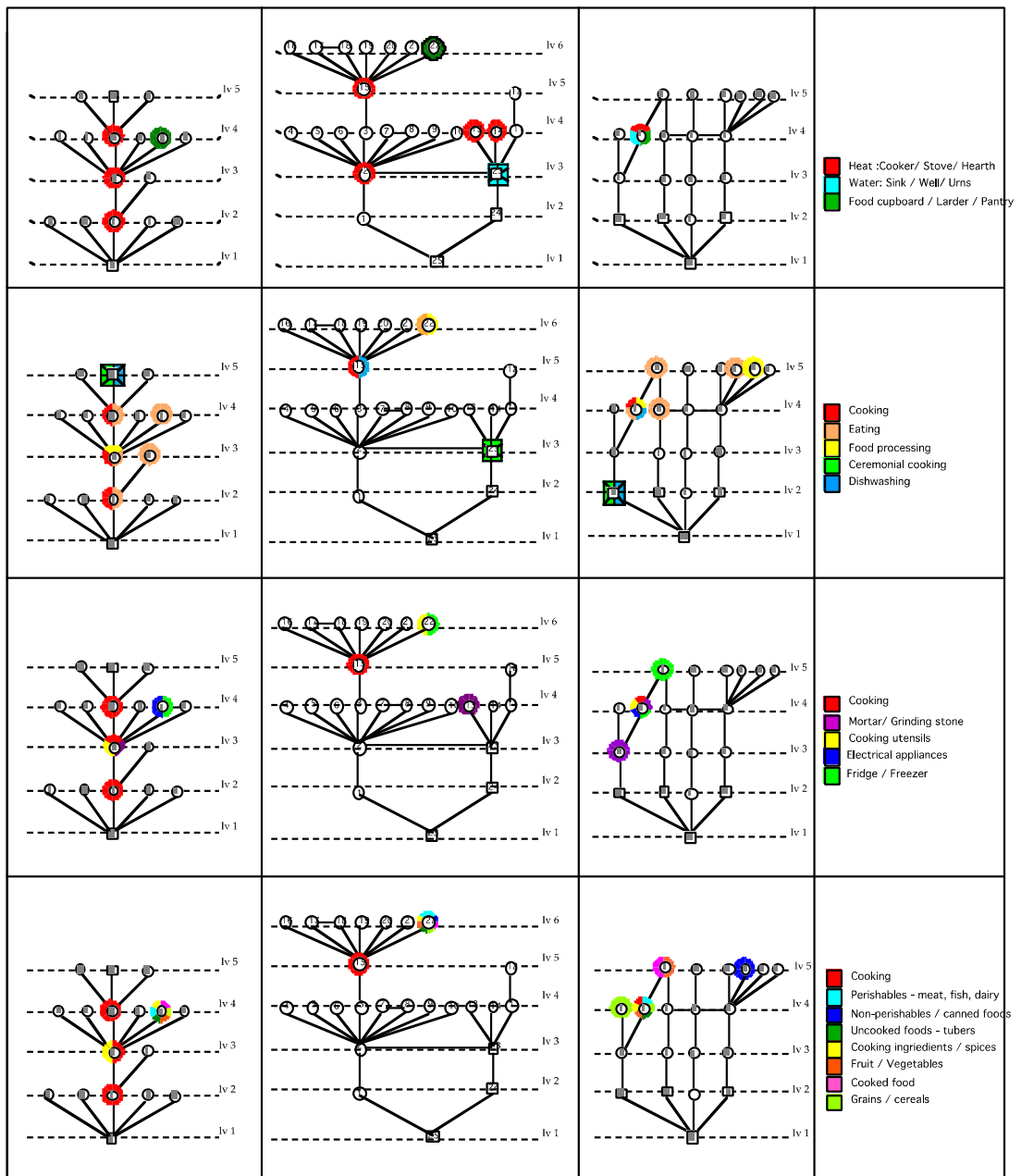


Figure 24: J-graph analyses for 3 basic nodes, and locus of activity, utensils and food (Source: Ekundayo 2007)

The graphs show that several spaces such as parlours and bedrooms had culinary footprints beyond the cooking space. The mean step depth for each activity, object and food was collated and then compared. The closer the mean is to zero, the stronger the boundary of the kitchen and the more self-contained the kitchen was and vice-versa. Having mapped every space in the house that contained a culinary related activity, objects and food on the j-graph, several patterns of space use, dispersal of culinary practice can be compared with one another. This representation is termed as the culinary mapping or culinary footprints of the houses, and was very useful in comparing the house types.

4.2 Benin Houses and space syntax characteristics

The organisation of Benin houses (i.e. traditional courtyard house, central corridor/apartment house and contemporary house) revolves around the distinction between public and private spaces, as privacy is the main cultural definer (Ezra 1992). The traditional courtyard house is typically between 5 - 6 steps from the exterior and contains several rings, the central corridor and apartment houses are usually more than 4 steps from the exterior and can be up to 7 steps from the exterior in the case of the two-storey apartment house. The contemporary houses are similar in their depth from the exterior: typically 4 to 6 steps from the exterior (see Figures 25 to 27). The central corridor /apartment houses and the contemporary houses are less ringy than the traditional Oto Eghodo houses.

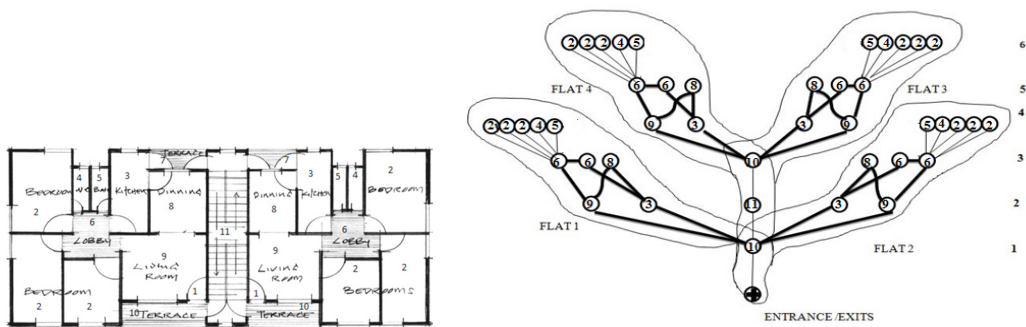


Figure 25: floor plan and J-graph of an apartment house (Source: Ekhaese 2011)

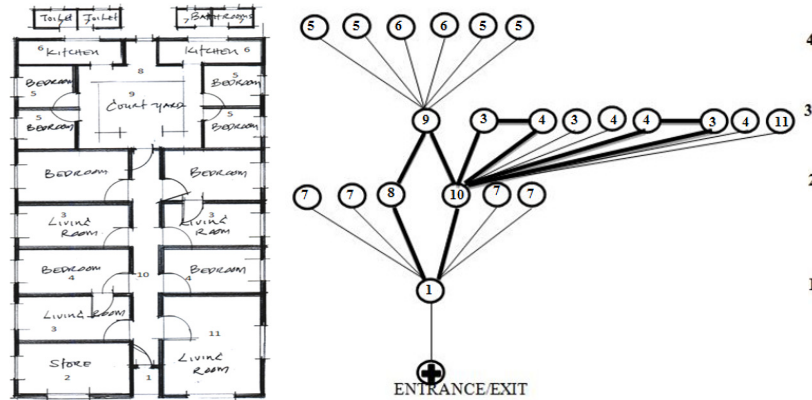


Figure 26: Floor plan and J-graph of a central corridor house (Source: Ekhaese 2011)

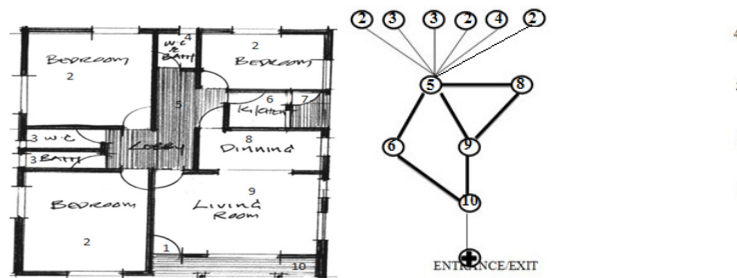


Figure 27: Example of a detached bungalow and its J-Graph (Source: Ekhaese 2011)

The three house categories have similar sections across the entire Benin-City, however contemporary houses include a range of new spaces such as the hall, the guest bedroom, and the guest convenience, hall (patio), garage, car porch, anti-room (foyer), gym room, study, laundry, although smaller houses from the traditional or the Central Corridor/Apartment category have fewer spaces and may not have spaces labelled as shop or dining. The inspection of the graphical representations of each map in the three houses categories, reveal some similarities in the morphological patterns of the Traditional and the Central Corridor/Apartment plans. J-Graphs of both types of plans reflect the division of the house into male and female domains. They are both composed of two parallel sets of branching trees each branch represents a separate sex domain connected to each other at different levels. On the other hand, graphs of contemporary house plans exhibit one branching tree containing both male and female quarters and surrounded by linearly related sets of open spaces and circulation areas.

Results of the analysis of the general syntax measurements show further evidence of continuity and change in the spatial organization of the three categories of houses. Values of syntax measurements like Integration, Depth, and Control reveal a change in the allocation and organization of spatial units/ functions in the three plans. Of the three measurements, depth values differentiate between the spatial allocation of male and female spaces of the same function in Traditional and institutional plans. In both settings, female spaces are at least one level deeper than male spaces of the same function. This spatial distinction vanishes in contemporary plans where male and female spaces of similar functions share all three syntactic values. Syntactic values also show considerable change in the allocation of specific spaces within the four categories of plans. For instance, the spatial position of the storage rooms changed from highly segregated, to relatively segregated, and to highly integrated in the traditional, institutional, and contemporary houses respectively.

The status of the female courtyard (harems courtyard) as the most integrating and the most uncontrolled in the traditional plan -a focal point from which other spaces radiate- has been taken over by the circulation lobby, and the hall in the institutional and contemporary settings respectively. Further, syntax values show changes in the kitchen position from segregated and deep in traditional and institutional plans to moderately integrated in contemporary houses. Bathrooms and toilets are segregated and deep in the traditional house but share similar integration and control values in all three types of plans; however, they are one level deeper in the contemporary plans.

5. Discussion: Morphology and Space use in Yoruba and Benin Houses

5.1 Morphological Patterns in Traditional and Contemporary Houses

Benin houses were found to be deeper than the Yoruba houses, for both the traditional, tenement/rooming and modern single household units. However, whilst the traditional Ile-Ife house is shallower than the modern Ile-Ife Houses, the traditional Benin house is slightly deeper than the non-traditional houses. The Orowa space in the Ile-Ife houses and the series of courtyards in the Benin houses were morphologically different. The Orowa space in Ile-Ife traditional houses functioned as a kind of a covered courtyard as mentioned earlier, and was very shallow in an already shallow genotype, whilst the courtyard systems in the Benin traditional house (Oto Eghodo) were deeper (see Figure 19; courtyards are shown as bold circles), which is consistent with the meaning and spiritually significant activities attached to these spaces. The Orowa space is syntactically and functionally opposite to many of the Benin courtyards- shallow, strongly integrated, multifunctional, and non-sacred.

Spaces such as the bedrooms, bathrooms and toilets were consistently deep, and the corridor was consistently shallow in both the Ile-Ife and Benin studies. However, the living room and kitchen were less segregated in the modern genotypes in Ile-Ife and Benin, suggestive of changes in the social structuring of the modern households in both contexts.

The Benin traditional houses also employed more transition spaces than the Ile-Ife traditional house, where movement is strongly controlled by the Orowa space, and is invariably direct from one function space into another, mainly because of a stronger need for privacy and gender separation. The impact of the imported 'Brazilian' house types is also more evident in Ile-Ife traditional houses, although both cultures borrowed significantly from this import for the tenement/rooming house design, in which significantly less cultural meaning seems to be embedded based on its commercial focus and the lower socio-economic group that is its main user. Finally, the modern houses in the Ile-Ife samples seem less culturally normative, whilst some of the culturally unique spaces in the Benin traditional dwellings (e.g. anti-natal room, menstruating room) remain or are transformed in the Benin modern houses; though also less normative than their traditional counterpart.

Both cultures share a geographical closeness, and a colonial past, but the varied domestic syntax reflects the relative openness of Yoruba culture to new experiences, and the more structured Benin customs and practices.

5.2 Space Use and Meaning in Ile-Ife and Benin Houses

Strong continuity in space use meaning in the Benin sample across the traditional and newer dwelling types was found, despite some changes in spatial morphology; in comparison to the Yoruba samples. These are discussed below.

5.2.1 Space Use and Meaning in Ile-Ife Houses

There was modest spatial distinction between personal, sacred, and communal 'zones', in the domestic space and access for non-residents, was mediated by a combination of individual and cultural regulations. Most spaces are accessible to both genders except where religious shrines are barred from female access. Correspondingly, just a few activities show a gender bias e.g. cooking and food processing.

The orowa space is the location of many domestic activities and objects as mentioned previously and vital to everyday living in Ile-Ife traditional area though personal objects and valuables are mostly kept in the bedroom. This does not necessarily translate into a public/private distinction as may be indicated in many western cultures, because the bedroom is sometimes accessible to close friends. The backyards, front porches and outdoor spaces remain an important aspect of traditional (and modern) Yoruba domestic life, dictated in part by climactic conditions, lack of indoor plumbing in poorer areas, but also by distinctions between 'front' and 'back' explained previously. The yard/outdoor space was used heavily for ceremonial cooking, food preparation and processing, doing and hanging laundry, vegetable patches, animal husbandry and occasionally for religious activities & festivals, small retail endeavours, and parties.

Finally, the relatively low specialization of space use in both Ile-Ife studies, particularly in the key spaces (e.g. living room, and bedroom) was noted. The generic function used to describe convex spaces rarely captured the variety of activities that occurred within many of the key space labels; indicative of high intensity of use of just a few space labels. The relative fluidity of boundary between culinary related activities and objects was also found in other

activities/objects with an inherent chronological sequence (e.g. washing and hanging laundry and ironing), and was also evident in the modern houses, but to a lesser degree.

5.2.2 Space Use and Meaning in Benin Houses

In an oral interview in 2009, Obobaifo stated that Benin domestic architecture “has over the century remained very sacred, making traditional compound a cultural symbol that is sectioned into private and public sections. Benin domestic space draws its meaning from certain beliefs which determine its organization, use and accessibility. Accessibility in Benin domestic space is determined by factors like age, sex, familiarity, relationship”. The Benin courtyard (Oto Eghodo) house is divided into sections like; sleeping section, receiving of visitors, storage, chambers, worship section, cooking, birth delivery section, harem for wives, playground, orchard, conveniences, Sitting room section and household head/owner’s section. Conveniences, utility, rooms, visitors sitting, shrine/altar, are separate from the main house. Each section is typically arranged around a courtyard/atrium called “Ikun” and can be categorized into Front, Back and Side Activity Areas (see Table 2).

Table 2: Space Use in Traditional Benin Courtyard (Otoeghedo) house

	Activity Area		Fixtures
1	<i>Ikun</i>	Atriums	<p>a. Fixed high- level windows (rectangle or triangular)</p> <p>b. Kitchen built behind main house</p> <p>c. The convenience built far from the main house to prevent contamination.</p> <p>d. The sizes of house depend on socio-political status of the household head</p> <p>e. Physical features of the traditional Benin architecture are: Wall fluted horizontally and column (pillars) fluted vertically, Architectural motifs and organization, Courtyards looking inwards, Massive carve doors, Sculptural design on the façade of building and Rectangular plans</p>
2	<i>Ikun’oderie</i>	Harem For Wives	
3	<i>Ikun’odowa</i>	Main Courtyard	
4	<i>Ikun’odore</i>	Fore Courtyard	
5	<i>Ikun’ahuera</i>	Courtyard For Ancestral Altar (Father)	
6	<i>Ikun’ahueye</i>	Courtyard For Ancestral Altar(Mother)	
7	<i>Ugha</i>	Living Room	
8	<i>Ughugha</i>	Bedroom	
9	<i>Ukoni</i>	Kitchen Area	
10	<i>Egun</i>	Section For The Household Head/Owner	
11	<i>Azar</i>	Vault, Bank And Storage For Valuables	
12	<i>Iba ore</i>	Out-Door Space	
13	<i>Egbe owa</i>	Convenience Personal Hygiene Spaces	
14	<i>Uho amen</i>	Impluvium	
15	<i>Oto eghodo</i>	The Courtyard Areas	
16	<i>Egbe Owa</i>	Convenience	
17	<i>Uhu eba</i>	Entrance Veranda	
	Aban	Harvested Farm Produce Storage	
	Aruebo_	Altar/Shrine	

Source:Ekhaese (2011)

Benin traditional courtyard house can be categorized into the outer court and inner courts and is divided into male/female quarters, with female spaces located at a deeper level than male spaces. There is a segregated anti-natal room, storage and a separated kitchen to seclude women from eyes of visiting male. A convenience is located some metres away from the main house, as its close proximity is considered to desecrate the house, reduce the potency of herbal and traditional medicine and cause ill-health. All the house types have this clear gender classification of space use however such distinctions may not exist in small contemporary houses with limited space (Osman, 2003). The spatial arrangement of spaces in Benin houses has spaces for private and collective use, and activity locations can be varied but depend on the nature of the activity and the status of its participants (Bradbury 1973).

5.3 Strength of Boundary of Culinary Activities and Objects

The strength of the boundary separating many activities and their related objects was quite fluid

in most genotypes in the Ile-Ife samples, but to a lesser extent in the Benin sample. On a justified graph, moving from one space to another is termed “moving a step”, and the more spaces being traversed from a carrier space, the greater the “step distance”. Table 3 below shows results from the Kitchens study, of the mean step depth for the locus of culinary activity (the cooking spot), storage of utensils (and appliances), and storage of food, and shows the step depths of a culinary-related variable from the cooking spot (the ‘Anchor’). Culinary mapping in the modern house (in both modern genotypes) is most self-contained, as it is closest to zero, followed by the traditional Orowa genotype, and the rooming houses are the least self-contained. Utensils storage is situated closest to the cooking space in all areas followed by activities and then food as might be expected.

Table 3: Mean step Depth for Houses for each variable (Kitchens Study; Ekundayo 2007)

Culinary Variable	Orowa Houses	Rooming Houses	Modern Houses
Mean Step Distance: Culinary Activity	1.389	1.68	0.90
Mean Step Distance : Utensils	1.271	1.41	0.482
Mean Step Distance: Food	1.612	2.21	0.930
Mean Step Distance: Total	1.486	1.95	0.844

All five culinary activities analysed are more than one step away from the cooking space, and eating can extend to almost three steps away, as it is perceived as a clean activity to be separated from the messy utilitarian kitchen (see Table 4). Nevertheless, all culinary-related activities tend to weaken the integrity of the kitchen boundary. Dishwashing was closest overall, due to its link with water supply, drainage and plumbing. This is followed by (messy) food processing, and ceremonial cooking; involving open fires and therefore hazardous.

Table 4: Step distance of activities from the cooking space in three Types (Kitchens Study; Ekundayo 2007)

Housetype	Cooking	Dishwashing	Food processing	Ceremonial Cooking	Eating	Mean
Orowa	0	0.85	1.389	1.689	1.87	1.489
Rooming	0	1.45	1.61	1.98	2.90	1.68
Modern	0	0.08	0.84	1.84	1.48	0.90

Table 5: Step distance of utensils from the cooking space (Kitchens Study; Ekundayo 2007)

Housetype	Mortar	Cooking utensils	Electrical Appliances	Fridge/Freezer	Mean Step Distance
Orowa	0.8	1.4	1.7	1.8	1.271
Rooming	1.0	1.1	2.4	3.06	1.411
Modern	0.6	0.1	0.7	0.6	0.482

Bulky implements like the mortar and pestle and grinding stone are closest to the cooking spot, whereas electrical appliances are furthest (see Table 5). That is due first to the location of the electric sockets, but in shared accommodation such as the Orowa and Rooming houses, appliances are kept and used in the rooms, and hardly ever in the kitchen, hence the increased step distances. In contrast, in the modern (single family) house, the step distances are just above zero. Most times, the utensils or appliances are kept in store rooms adjoining the kitchen. For food storage, modern house kitchens have stronger boundaries than Orowa and Rooming houses, where food is usually kept away from the kitchen for security reasons, which range from risk of theft, to concern about poisoning by co-resident rivals. Overall, the biological link between residents in orowa and modern houses supports the frequent use of shared communal spaces for daily living activities, whereas, the opposite is more prevalent in non-related

households in rooming houses.

6. Conclusions

The Ile-Ife traditional house is quite distinct from the Benin traditional house. The Orowa house with its direct linkages of rooms correlates with less spatially demarcated hierarchy which is much more controlled in the Benin Oto Eghodo house. Whilst Yoruba culture also has a class structure of King, Traditional Chiefs, Freeborn, and Palace staff, its domestic domain seems a more egalitarian place in terms of gender constructs, and distinctions between front and back. This difference is reflected in the variation in the depth of traditional Ile-Ife and Benin houses. The stratification of domestic activities and objects was also evidenced in the 'special' function spaces encountered in the *Oto Eghodo* house (e.g. menstruating room, etc) which are completely absent from the Orowa house. That the traditional Benin house is less influenced spatially by the foreign models is obvious, but there is a more ready adaptation of some of the features of the foreign models for the Benin tenement houses. However, there are more similarities in the syntactic and spatial format of the modern houses in the two cities, in terms of types of function labels, and to a lesser extent space use. The relative fluidity of the strength of boundary for specific activities such as for culinary related activities is more evident in the Orowa house, than the *Oto Eghodo* house, but both samples from the two cities demonstrate a similar trajectory from traditional to modern houses in increased strength of boundary, and more 'fixity' of object location however modest the changes. In conclusion, the morphological, space use and strength of boundary variations indicate a level of complexity that supports the decision to combine spatial and sociological analysis in domestic spaces.

7. Further Research

An obvious line of enquiry would be a comparative study- this study utilised three separate studies and was able to identify overlapping areas of focus in all three in order to generate a discussion- as such, a single comparative study will provide more defined areas of interest. A second aspect that would benefit from further research is the aspect of the strength of boundary for other domestic activities; both in a traditional and more contemporary setting.

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