FRONTAGES AND SETBACKS: A COMPARISON OF ENGLISH AND NORTH AMERICAN SUBURBAN HOUSES

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ABSTRACT

This paper is interested in the physical form of frontage and in the elements of urban form that may influence it. Studying its morphology involves looking at all the scales to provide a comprehensive image of how it is taking shape. This work presents a survey of different type of suburban houses to show alternative models of frontage with a focus on North American models and their British counterparts. It then questions the meaning and value of transition space at the scale of a neighborhood, highlighting the role of main thoroughfares and back alleys creating a hierarchy in the street frontages. It finally explores how the building and the plot respond to the street hierarchy by use of yards, room layout and architectural features.

Keywords: frontage, setback, suburban housing

INTRODUCTION

The role of frontage is to help to transition from the space of the street to the space of the plot. As an interface, it is the spatial realisation of the relationship between buildings and public space (Carmona, 2010; Dovey and Wood, 2015; Kamalipour, 2016) and carries the potential for interaction by means of accessibility, visibility or context (Bobić, 2004; Palaiologou et al., 2016, Wir-Konas, 2019, pp.102-107). As the interface between individual territory and communal space, it is where spatial negotiations occur and are expressed. The spatial negotiation is in two directions: along and across the street. In the along direction, individual plot frontages relate to adjacent ones to create a consistent street frontage and participate to the identity a neighborhood. In the other direction, the frontage acts as a buffer zone to protect private spaces. In single-family houses, the frontage can facilitate or prevent social interactions depending on its morphology. With urban sprawl, for example, the frontage is characterized by very deep setbacks that physically disconnect the building from the space of the street and create social distance. Many argue that the regulation of setbacks and other aspects of frontage can help in creating a more balanced relationship between the notion of community or neighborhoods and individual territory (Lewyn, 2004; Talen, 2012). One concept that includes the two directionalities of frontage is the concept of street enclosure (Talen, 2003; Ewing & Handy, 2009). Establishing street profiles can help in assessing the level of street enclosure and how frontage and setback relate to each other.

This paper is interested in the physical form of frontage and in the elements of urban form that may influence its form. Studying its morphology involves to look at all the scales to provide a comprehensive image of how it is taking shape. It questions what a transition space means at the scale of a neighborhood, highlighting the role of main thoroughfares and back alleys creating a hierarchy in the street frontages. It then explores how the building responds to the street hierarchy by architectural features (Vialard & Bafna, 2009). It presents a survey of different type of suburban houses to show alternative models of frontage. The focus is on North American models where

sometimes setbacks overtake frontages, and their British counterparts with more seemingly restraint setbacks.

The North American sample is mostly composed of static tissues where plots and streets were planned together and built over a 10-20 years period with a consistent building type (Scheer, 2010). The British sample includes estates that were developed at once and speculatively for an unknown client, which meant that the building types reflected socio-economic context rather than individual preferences (Wir-Konas, 2019, p.55). The North American sample is representative of four distinct suburban house types popular across the country. Neighborhoods located in the Greater Atlanta are selected based on the concentration of these types: 1) Bungalow from the 1920s in Midtown, Atlanta, 2) Cottage house from the 1940s in Oakland city, Atlanta, 3) Ranch house from the 1960s in Sandy Springs, and 4) Double garage house from the late 1980s in Brookhaven. The British sample is made of four estates located in Gosforth, a neighborhood of Newcastle-Upon-Tyne. The estates were built in different periods and represent four distinct single-family house types: 1) Terraced houses from the 1880s, 2) Semi-detached houses from the 1920s, 3) Semi-detached houses from the 1960s, and 4) Detached houses from the 1980s.

STREET PROFILES OF FRONTAGE AND SETBACK

The entity of frontage is defined by the property line located at the edge of a plot in contact with a street, also called front line. To measure the relationship of frontage with the street, the plot and the building, the front line is populated every meter with data points from which a perpendicular line, or line of sight, is drawn on each side until it reaches another property lines of the plot, and a street centreline (Vialard, 2013; Araldi, 2019). Where these lines of sight are intercepted by outlines of building, or sidewalk, it provide information about the depths of plots, buildings, setbacks, sidewalks and roads. The values are averaged to establish the street's profile, representative of each neighbourhood and estate (figure 1 & 2). Other traditional measures are provided such as plot, building footprint area and width.

Style	***Terraced***	***Semi- 1***	***Semi-d 2***	***Detached***	***Bungalow***	***Cottage***	***Ranch***	***Double garage***
Period	*1880s*	*1920s*	*1950s*	*1980s*	*1920s*	*1940-50s*	*1950-60s*	*late 1980s*
Location	*UK*	*UK*	*UK*	*UK*	*USA*	*USA*	*USA*	*USA*
n plot	*495*	*206*	*299*	*179*	*541*	*388*	*496*	*447*
Plot area (m^2)	*172*	*766*	*406*	*398*	*697*	*896*	*2189*	*682*
Building footprint	*84*	*164*	*106*	*92*	*217*	*128*	*225*	*184*
Built ratio	***49***	***21***	***26***	***23***	***31***	***14***	***10***	***27***
Plot depth (m)	*24*	*49*	*30*	*27*	*41*	*43*	*59*	*28*
Plot width	*7*	*16*	*13*	*15*	*17*	*21*	*37*	*24*
Setback depth	***6***	***8***	***8***	***8***	***13***	***11***	***20***	***6***
Building depth	*12*	*12*	*9*	*9*	*14*	*10*	*10*	*13*
Building width	*7*	*13*	*12*	*11*	*14*	*12*	*22*	*15*
Built frontage	***97***	***86***	***87***	***73***	***84***	***59***	***58***	***62***
Sidewalk depth	*1.9*	*2.3*	*2.3*	*2.7*	*2.7*	*2.4*	*3.5*	*4.5*
Street depth -half	*2.8*	*4.2*	*2.7*	*3.1*	*5.2*	*5.2*	*4.3*	*5.9*

Enclosure width	***22***	***30***	***25***	***28***	***41***	***37***	***56***	***37***
Ratio enclosure to total depth %	***39***	***27***	***36***	***43***	***42***	***37***	***42***	***44***

Figure 1. Measures of depth averaged by plot/building: plot size, frontage and setback (metric). Enclosure width is the length from building line to building line across a street.

Street profiles (figure 2) highlight the differences in scale between the UK and the USA, to the extent in which four plots of UK terraced houses would fit in the front lawn of a single North American Ranch house. These two types represent opposite strategies in terms of built density with a building coverage of only 10% of the plot for the ranch houses compared to half of the plot for the terraced houses. However because the ranch house is wider than deeper the built frontage remains consistent with the other American styles (around 60%). Yet, the depth of the setback, 20m, makes the built frontage irrelevant. It is also associated with the absence of sidewalk, covered by the front lawn, which bring the total mean depth to 23.5m. By comparison, the more recent setback for the double garage house has been reduced substantively to 6m, the equivalent to the UK terraced.

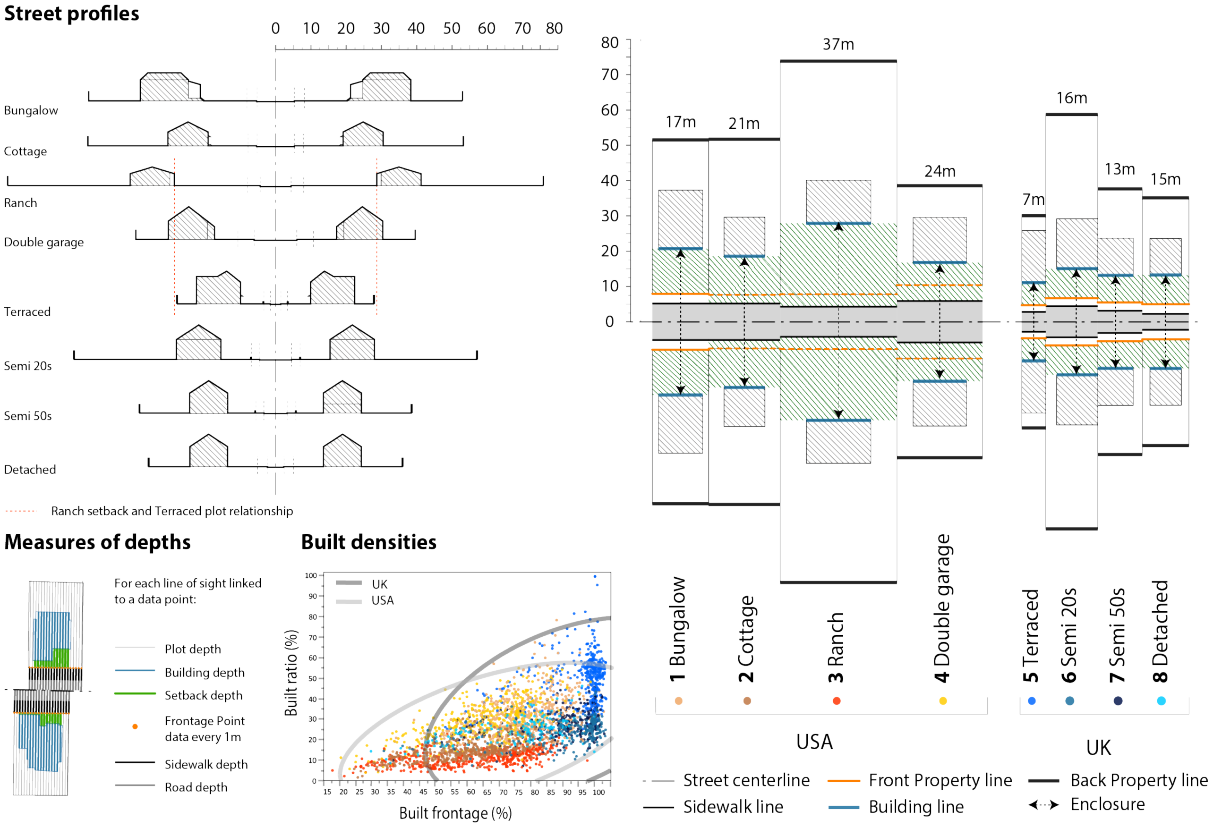

Figure 2. Street profiles for each types based on the mean values of plot, building, setback, sidewalk and road depths. Showing mean sizes of plots and building. Frontage width and depth. Relationship between built frontage and built ratio.

The open space between two building lines across a street (street width, sidewalks, and setbacks) begins to show the level of enclosure of that street but also of social distance. It ranges from 22.1m (5) to 55.8m (3). While there is a clear distinction between UK and US setback distances, the difference in building footprints is not of the same proportion. Depth of building remains consistent and within a relatively small range (9 to 14m).

At the city scale, the main thoroughfares constitute in a way the urban frontage, and act as interfaces between neighbourhoods. The first step is to determine the primary street structure or foreground network, which consists of the most visible thoroughfares. Their presence and location will indicate the level of accessibility of the neighbourhood from the city at large. The street network of the neighbourhoods and estates is assessed according to its configurational properties, following a Multiple Centrality Assessment protocol implemented in the Urban Network Analysis Tool (Sevtsuk and MecKonnen, 2012). It computes Betweenness values that capture the degree of through movement of a street segment in relation to the whole network (Porta et al. 2006). Streets with high values correspond to main thoroughfares while a null value is associated to a dead-end (figure 3). Reach values are also provided to assess the level of accessibility from as set distance. Reach measures the amount of street network available within a set distance. It is a measure of street density. The set distance are 400m, equivalent to a 5 minute walk, to assess local density, the immediate network, and 2.4km to assess a more global density, the city scale.

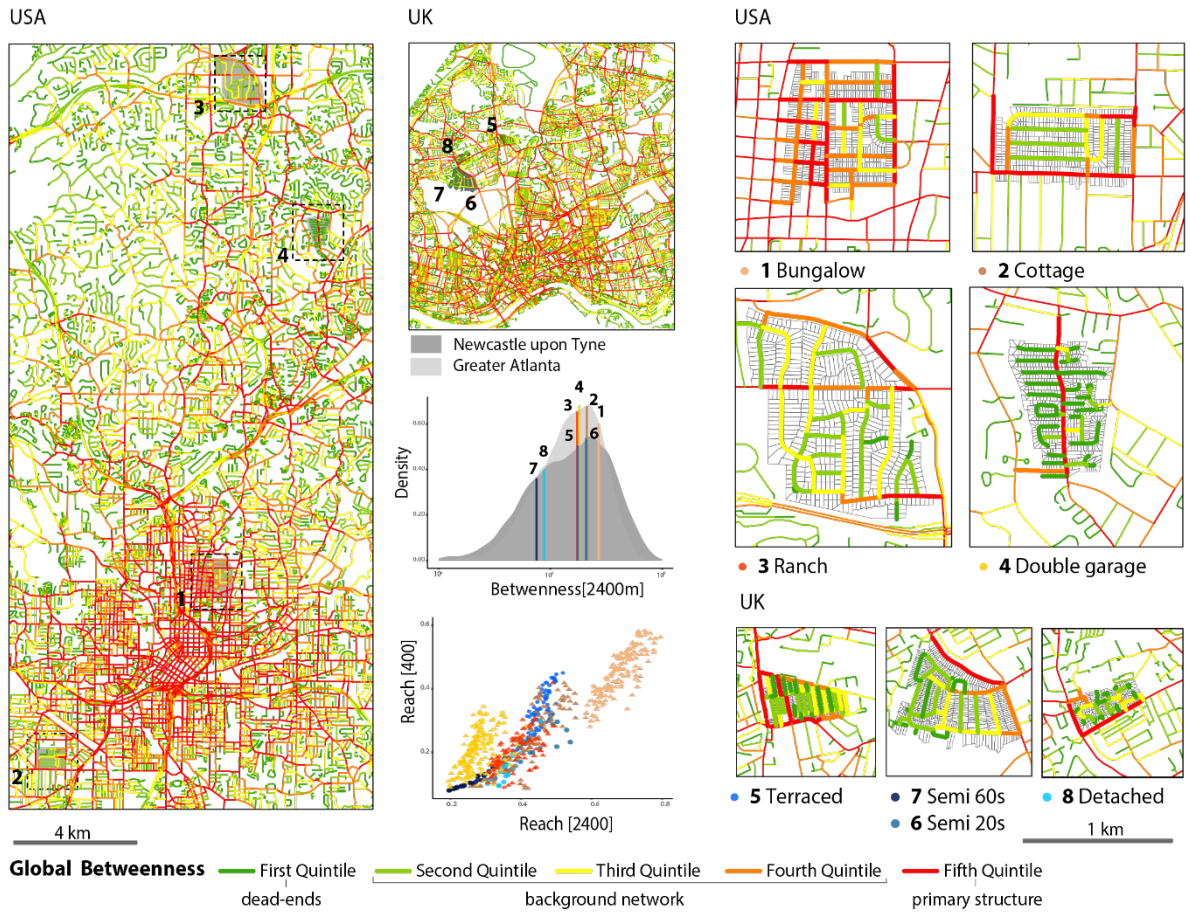

Figure 3. Global Betweeneess mapped with a quintile segmentation to characterise the primary structure (5th), the background network (2nd, 3rd and 4th), and the cul-de-sac and lollipops (1st) at both city and neighbourhood scales.

In Atlanta, the primary structure is densely present in the highly regular grids of the downtown and midtown areas while the suburban areas have only few main thoroughfares. In Newcastle, the primary structure is more evenly distributed which make the suburbs more connected than Atlanta's ones. The configurational analysis in figure 3 highlights the location of main thoroughfares in each neighbourhood, which can play an important role in providing an anchor to the neighbourhood.

All the selected neighbourhoods include main thoroughfares. As highly accessible and potentially highly used streets, there is a need to create a transition to quieter residential streets.

The street structures of the neighbourhoods show two main urban strategies. Main thoroughfares are either located at the edge of the neighbourhood (2,6 & 8), or they are traversing it (3,4 & 5). The only exception is the Bungalow neighbourhood (1) located in the Midtown gridiron for which the betweenness values are both high and evenly distributed. In most cases, the transition has been controlled by using streets to gradually decrease or lower accessibility (2,3,5 & 6). However, the most recent neighbourhoods, have very polarized structures with few highly accessible elements and many low betweenness, and no gradual transition between them. Dead-ends are directly linked to a main thoroughfare (4 & 8), there is therefore a need to implement a buffer at the plot or building scale.

At the building scale, the topological analysis of typical floor plans representative of each type gives an understanding on the relationship between all of the spaces in the house. Justified graphs for each house clarify the level of privacy and publicity of each room in relation to the exterior, highlighting the configurational strategies implemented to manage privacy (Hanson, 2003). Typically, the analysis of internal configuration does not include or distinguish between outdoor spaces such as front, back or side yards. In this study, they are included as distinct spaces to reveal the complex ringy structure between the interior and exterior that will be otherwise omitted. Each node of the graph represents an internal (room), transitional (terrace), or external space (yards) They are arranged according to how many steps they are removed from the street (carrier space - level 0) (figure 4).

Figure 4. Typical floorplans of single-family houses representing each type and their configuration on the plot captured by the justified graph.

External spaces and transitional spaces mediate the relationship between the house and the street. There is a need for a space that mediates the relationship between the public and the private and it needs to be multi-levelled. One step is not enough as shown in all the types. Each house type has multiple ways of mediating the transition from the public realm to the house through at least two unique routes. In both US and UK, the social internal spaces (LR, DR, K) are configured around two routes through the house that can be related to two types of users: a visitor and an inhabitant. For the visitor the first social internal space they are privy to access is the living room (level 3 or 4), which follows after a series of external and transitional spaces. This allows the inhabitant to control the access to its private domain. In the second route in most cases the first social internal space accessed is the kitchen (level 3 or 4), which allows the inhabitant to conduct everyday activities without going through the transitional spaces and formal rooms (such as a formal living room). In most cases the kitchen can be accessed directly from the external side or back yard or through a supporting space such as a pantry or a utility room. The bedrooms are the deepest regardless if they are located on the ground or first floor. Interestingly, the dining room tends to be the deepest

of all the social internal spaces, and can be as deep as the bedrooms, meaning that the dining rooms are the most private "social" rooms in the house.

FRONT, SIDE AND BACK.

This analysis has shown that the configuration of the street network can establish a hierarchy between the streets to allow for various levels of accessibility, therefore privacy. This hierarchy can impact how the building is occupying the plot depending of its location and number of frontages. Corner plots and traversing plots have the possibility to address different street conditions. The percentage of front, side and rear frontage (figure 5) indicates the presence of corner plot or traversing plots in each neighbourhoods. The presence of back alleys in the Bungalow and Terraced houses is an example of how the morphology of the plot responds to the street hierarchy.

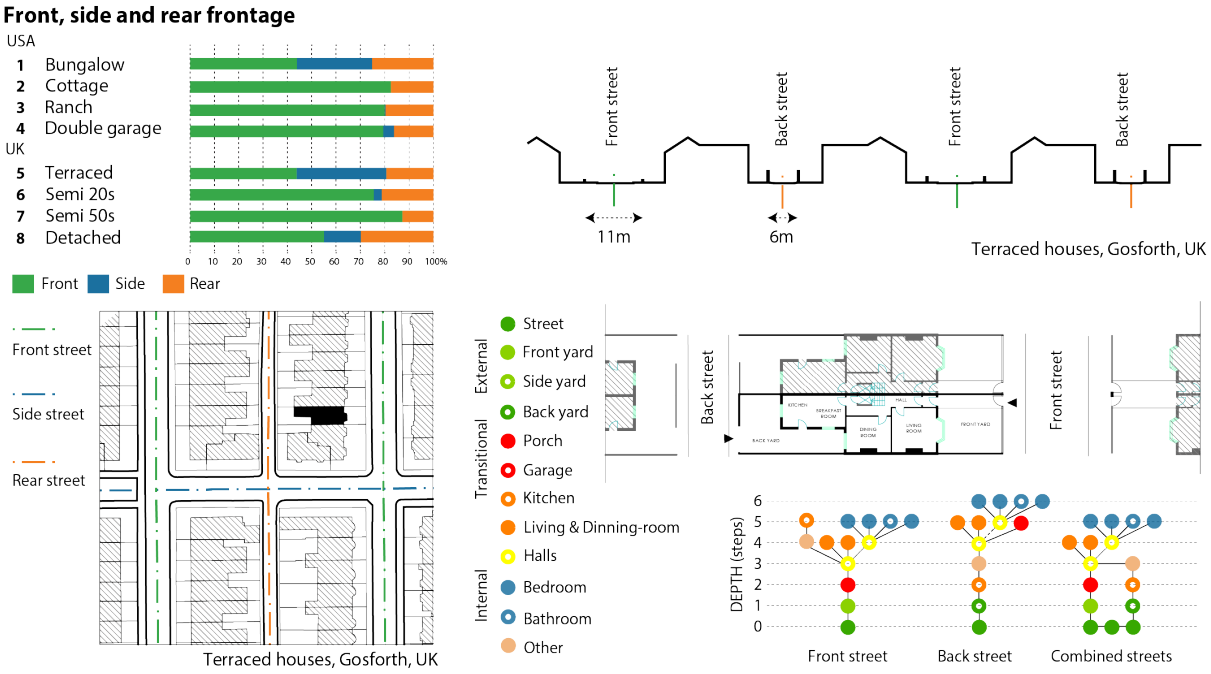

Figure 5. Example of a neighborhood with clear distinction between front, side and rear streets. The street profiles and the justified graphs associated to each street profile.

At the level of the building layout, the different versions of the justified graph exemplified how the configuration of the house changes depending on its approach from the back (inhabitant) or from the front (visitor). The third graph highlights the ring structure of the graph illustrating the circular movement from inside to the outside by including both external and transitional spaces as equally important. If only internal spaces were considered most of the houses would have a tree-like structure as illustrated in the two other graphs and the ring structure would be lost.

CONCLUSIONS

Level of privacy can be built in the configuration of street network and plot subdivision as well as in the layout of the building and its placement on the plot. By being more exposed to vehicular or pedestrian traffic the primary streets act as the neighbourhood frontage. The configurational study of neighbourhoods highlighted different approaches to transition from public to private space. While traditional urban grids provide a range of values establishing a gradient level of privacy, it

is absent in the more recent neighbourhoods with adjacencies of main thoroughfare and dead-ends. Transition, then, needs to occur at a different scale. In the UK, the current trend is to develop estate that turn their back to the main thoroughfares and limit the number of vehicular access to the estate. As a result, the frontage of main thoroughfares consists of blind walls that are not conducive of interactions. Rather than turning their back to the main streets, architectural strategies can be used to temper and soften the transition from very private to very public. They can be use of transitional elements such as porch, stoop or vestibule. It can use setbacks which dimensions can be controlled by a balanced level of street enclosure.

Further work is required to fully understand their relationships. Other strategies should be included such as the use of building height and density to create a buffer. On plots located on primary streets in Midtown and Sandy Springs, some of the single-family houses are being replaced with a different housing type: high-rises and medium height buildings in Midtown, gated-communities turning their back to the main road in Sand Springs similar to the detached houses estate. Another strategy used in the terrace house estate has been to lower the vehicular accessibility by blocking street while preserving pedestrian accessibility.

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