

#55

PLANNING CODES AND THE DESIGN OF THE STREET INTERFACE

Reading the impact of spatial configuration on street life using micro-scale tools

LUIZ CARVALHO FILHO

Faculty of Architecture, TU-Delft
l.m.decarvalhofilho@tudelft.nl

AKKELIES VAN NES

Faculty of Architecture, TU-Delft & Department of Civil Engineering, Western Norway
University of Applied Sciences
a.vannes@tudelft.nl, avn@hvl.no

ABSTRACT

This contribution is part of a PhD research. The study investigates the factors related to the vitality of street life in Brazilian cities. To what extent play urban form a part in forging the vitality of street life and why? What is the impact of the urban planning regime on the relation between urban form and vitality? That second factor will be further explored in this paper. Our research question is: to what extent have space syntax contributions been extensively identified and classified so that planning codes of a city can make practical use of them? In other words, is it possible to have a shared language between space syntax and urban planning codes? The initial case study in this research is the city of Recife in the northeast of Brazil, a city that has been extensively discussed in previous space syntax symposia.

The first part of the article reveals the spatial parameters commonly regulated in the planning instruments of Recife. In a second part, space syntax theory and methods developed for micro-scale analysis are used to describe the transformations in the urban environment. That part investigates the impact of the utilisation of the current municipal rules and the possible effects related to urban vitality. Once again, this study will focus on the building frontage and nearby spaces. Finally, a discussion to what extent the space syntax research results and convergences can be decoded into the language used in planning instruments is appropriate. As it turns out, there is a need to develop an operational conceptual framework accessible for planners. In short, this study presents contributions to the formulation of urban norms.

KEYWORDS

Urban codes, spatial configuration, planning instruments.

1. INTRODUCTION

Space syntax is mostly regarded as a sociospatial theory, capable of decoding the materialities of social – spatial relations using "*models, which are regularities in the relation between spatial structures and functioning*" (Hillier 2009). Our research question is: are these regularities extensively identified and classified so that planning codes of a city can make practical use of them? In other words, is it possible to have a shared language between space syntax and urban planning codes? That question deals with two aspects, on the one hand, it resonates the challenges presented in previous studies regarding the combination of space syntax methods with urban morphology (Netto et al. 2012; Pont & Marcus 2015; Gkanidou et al. 2015). On the

other hand, it searches for applications of what Hillier identified as the primary aim of space syntax, "to arrive at spatial descriptions of buildings and cities with the minimum intervention of linguistic concepts" (Hillier 2013). In that sense, this research aims at the micro-scale level, an emerging field of study using space syntax theory and methods that have shown a significant relationship between spatial configuration and street life (van Nes & López 2007).

This contribution is part of a PhD research. The study investigates the factors related to the vitality of street life in Brazilian cities. To what extent play urban form a part in forging vitality of street life and why? What is the impact of the urban planning regime on the relation between urban form and vitality? The definition of vital street life and urban vitality in this inquiry is that people stay and use public spaces and that adjacent buildings have activities on the ground floors oriented towards the streets. The aim of the research is to investigate how urban rules or the set of norms and planning devices of a given city can be structured to foster urban vitality in the public domain. The initial case study in this research is the city of Recife in the northeast of Brazil, a city that has been extensively discussed in previous space syntax symposia¹.

One of the hypotheses of this research is that urban rules are determinant to define a space where street life and urban vitality can thrive. That is extremely relevant in the Brazilian setting and particularly in the case of Recife where the action of the real estate market associated with a reduced role of planning institutions has resulted in a severe physical disruption regarding opportunities for street life.

This reflection resounds the thesis proposed by Lucas Figueiredo (Figueiredo 2012) in his article 'Desurbanismo: Um manual rápido de destruição de cidades'.

'The growth and development of several Brazilian cities during the past two decades was not just random or disorganised. It produced, predominantly, architectural typologies, spaces and transportation systems that favour a few ways of life over all others. This disurbanism has feedback loops that create physical structures that hinder other ways of life while resulting in cumulative advantages for the favoured ways, a spiral that continually produces new disurban trends' (Figueiredo 2012).

In his writing, Figueiredo explores five processes that are, according to him, responsible for the urban destruction in Brazilian cities: growing use of cars, lack of quality in public transportation, high walls and gated communities, loss of diversity and adaptability of buildings and segregation of people and ideas. In this article, we trace the origin of these architectural typologies, relating their elements and spatial configuration with a set of planning instruments.

The first part of the article reveals the spatial parameters commonly regulated in the planning instruments of Recife. That is demonstrated through a retrospective of the planning codes of the last decades (Carvalho Filho 2014), analysing and relating planning regulations to specific spatial parameters and the resultant spatial configuration. In this article, the focus will be on the interface between public and private domains, analysing the role of planning instruments in the shape of this border.

In a second part, space syntax theory and methods developed for micro-scale analysis are used to describe the transformations in the urban environment. That part investigates the impact of the utilisation of the current municipal rules and the possible effects related to urban vitality. Once again, this study will focus on the building frontage and nearby spaces. Finally, a discussion to what extent the space syntax research results and convergences can be decoded into the language used in planning instruments is appropriate. As it turns out, there is a need to develop an operational conceptual framework accessible for planners. In short, this study presents contributions to the formulation of urban normative.

1 Some of the previous papers presented at various space syntax symposia about Recife discussed in more detail certain aspects that are discussed in this article such as: the fragmented spatial configuration of the city (Carvalho Filho et al. 2015), the role of private spaces and real estate market (Amorim & Loureiro 2003) and safety perception and crime (Monteiro & Cavalcanti 2015).

1.1. DILEMMA

Before starting the analysis of the planning instruments and the contribution of space syntax theory, there is a dilemma or apparent contradiction that must be clarified. This paper deals with urban rules understood as a translation of larger plans or visions into a set of parameters that once applied will result in a given spatial configuration. The aim of this research is to evaluate the effectiveness of these instruments in fostering spatial quality, urban vitality.

These tools are commonly plot based and are responsible for guiding the incremental construction of the city by aggregation of individual buildings. Therefore the domain of action of urban rules is centred in the **local** properties of spatial configuration.

Natural movement theory puts that *"If we wish to design for well-used space, then we must design with the knowledge that integration is a global variable, and movement in particular spaces is not determined in the main by the local properties of that space, but by its configurational relation to the larger urban systems"* (Hillier et al. 1993).

That apparent contradiction in the scale of action, local – global, opens the questions about the effectiveness of rules applied on a local level and that affect the global configuration in an indirect and incremental way, to what extent can space syntax contribute to the formulation of these instruments. In that sense, this research continues the investigation about micro-scale spatial variables and builds upon the findings that *"the micro-spatial conditions of the street segment are related to the macro spatial conditions of the city network"* (van Nes & López ibid).

The local configuration can provide elements to reinforce and sometimes contradict (Netto et al. 2012) the results of the global analysis. However, combined analysis represents an approach to have tailored methods to deal with specific contexts (Pont & Marcus 2015).

To overcome the dilemma local – global one must also consider the usual dual scale of tools or rules. Although rules are locally applied, they must be placed in specific parts of the city according to a reading of the global configuration, in that case, the relevance of global configuration is reinforced. For this paper, we focus on the local scale and the spatial configuration of plots and blocks in relation to the whole city's street network integration.

2. PLANNING INSTRUMENTS IN RECIFE

The review of the planning tools in Recife in the last decades that will follow intends to identify the mechanisms related to design control, whether it is explicit or not in the laws texts. It is an attempt to identify *'the process of state-sanctioned intervention in the means and processes of designing the built environment in order to shape both processes and outcomes in a defined public interest'* (Carmona 2016).

Recife has to some degree experienced pioneer interventions in planning such as the partially implemented plan for the expansion of the city. It was commissioned in 1637 by Nassau during the Dutch domination of the region (1630-1654) and are regarded as one of the first urban propositions based on physical interventions in the Americas (Medina 1997).

In general, planning in Recife can be organised into three main periods that somehow correspond to three main planning doctrines as pointed by Sarah Feldman when studying the evolution of planning practices in Brazil (Feldman 2001).

In the period preceding the first two decades of the 20th century, there was a dominant European tradition in the formulation of laws and postures that governed construction in the city. These regulations were mainly focused on hygienist and aesthetics aspects.

The decades of 1920 – 1930 are a period of transition where there was a shift from the European tradition to the adoption of certain postures that referred more to American planning practices, such as zoning plans and parkways for example.

The last period proposed by Feldman, post 30's is the one under the influence of Modernism. The first shift was towards a higher level of flexibility in the planning instruments, greater

involvement of architects and planners in the decision process and a following change in the urban fabric by the transformation of the parcels and land use.

2.1. THE PERIOD BEFORE 1920

As stated before, the regulations of that period are mainly addressing hygienist and aesthetics aspects of the construction of the city. That is evident in the importance given to the control of street alignments, in the location of different activities in the city and the regulation of built environment regarding open space.

From that period are the Municipal Law 4 from 1893 and the Law 1051 from 1919. The first one is a Municipal Code of Postures, instrument established in the country by federal law where planning tools were still part of the main body of the city regulations. The language and scope of the legislation from that period do not address specifically those involved in the design and construction of the city. It was a broader instrument to assess how the city should perform in general addressing many aspects, not only those related to land use or typomorphology.

The second one, law 1051, shows already some degree of specialisation regarding the first, there was an overall conception of the city based on an underlying zoning plan that determined four perimeters in the city, main, urban, suburban and rural. In this first division of the city into zones, there was, as observed by Alves (Alves 2009) a prejudiced organisation of the city by income and social level by defining what type of construction was permitted in each zone. For example, not allowing in the main centre of the city the building of the kind of dwellings inhabited by low-income population.

Regarding urban form, there was a clear connection and hierarchy between the building and public space related to the zoning. The spatial result of this instrument was a radioconcentric configuration where the density of occupation was higher in the centre and incrementally lower towards the limits of the urban area following the indications of the previous law.

The maximum height of the buildings was different in the zones and proportional to the width of the streets, ranging from 2 times the street width in the central zone, 1 ½ and 1 in the urban and suburban zones respectively. The minimum setback from the buildings also varied, from 0 in the centre to 3 to 5 in the successive zones. In the central zone, all constructions should be built observing the general alignment of the streets; there was also a minimum height limit and some artifices to allow taller buildings such as the construction of arcades along the streets.

2.2. 1930 – 1960'S

In Recife, that period is initially characterised by a revision of the law of 1919 in 1936 that introduces new subzones into the existing zoning plan. Functional subzones are created inside each of the first zones, defining different parameters for buildings according to their function. Another point introduced by this review was the introduction of the figure of coverage or percentage of the plot that could be occupied.

In the last years of this transition period, two new laws or decrees adjusted some of the parameters imposed by the law of 1936, the Decree 27 of 1946 and the Law 2590 of 1953. The first one changed the height limit in the city centre, aligned to the image of the modern city. The 1953 law changed the borders of the urban area, expanding it to the south following the expansion of the city observed along the beach front. It also increased the building coverage in that zone, maximising the construction potential.

In 1961 the law 7247 reviews the construction regulation of the city that dated from 1936. This revision represents an expansion of the urban area towards the west and the creation of distinct zones regarding the port, commerce, industry, universities and nature reserves. Segregation of low-income residents of the urban area is still part of the law as it states specific conditions for the location of new developments targeted to that part of society. Those housing complexes could not be located close to public spaces or main streets.

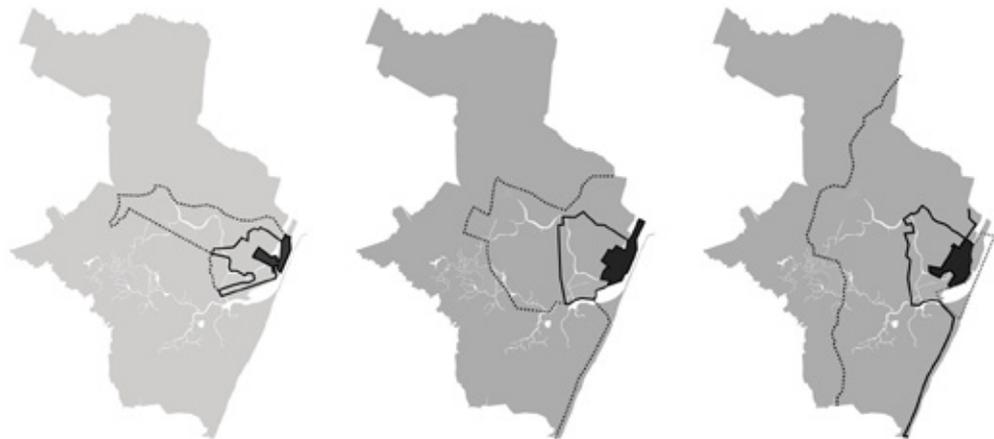


Figure 1 - Plans of 1919, 1936 and 1961 showing the evolution of the city and how the urban, suburban and rural boundaries have changed in time. Source: (Alves 2009)

2.3. 1980-1990'S

The law 14511 from 1983 represents a significant shift in planning regulations in Recife. Such change is represented by the disconnection introduced in this act between public and private spaces in the formulation of the parameters to regulate construction. As pointed by Medina (Medina 1997) the introduction of accurate and detailed parameters to control the use of plots, in a system of zones, represents the total inversion in the symbolic value of public – private domains, transferring to the individual plot and housing units the central role in the city regulations.

That shift in importance to the housing sector and plot scale is perceived in the zoning as higher allowed densities are now found in the city expansion in the south, no longer at the city centre. The detailed and specific parameters introduced in this law are not only related, like in previous instruments, to different zones but now they are dependent on the building function. That relation between parameters and function promoted an occupation of the city in a generic way; buildings are planned detached from the specific local conditions. Such aspect resulted in a reaction from inhabitants from certain historic districts that led to the establishment of more restrictive parameters, reducing maximum building height, in some of these zones.

In 1996 the law 16176 replaces the previous instruments and promotes a drastic revision in the zoning patterns and the construction parameters. It almost eliminated the relation between parameters and land use, and there is a simplification of the city structure.

The major differences between construction parameters in the zoning are related to coverage, initial setbacks and green ratio. In the areas where construction was expected to be less intense, the green rate reached 50% of the plot, and maximum coverage was of three times the plot area. Repeating a pattern described previously, the regulations in this law had unexpected results that generated a public reaction and had to be fixed in a set of new rules.

The law 16719 from 2001 addressed the excessive construction observed in some districts of Recife, mainly following the river. Maximum height for buildings was introduced in this area per a classification of streets. Height was restricted from eight to twenty floors and typically followed the location of the roads regarding the river or historic areas.

2.4. CURRENT PLANNING INSTRUMENTS

In 1988 the Brazilian Constitution established the Plano Diretor² as the core tool for development and city planning. Every city with more than 20 thousand inhabitants is obliged since then to

² Master plan or zoning plan are not accurate translations for the term as Plano Diretor involves zoning, building regulations but also a set of broader goals for the city's future, regarding public health, education, housing etc.

have a Plano Diretor and to review it every ten years. After the federal law now as Estatuto das Cidades³ (2000) this obligation has been extended to cities that are part of metropolitan regions, conurbations and inserted in special zones such as environmental or historical. In the same federal law, it was also stated that Plano Diretor should be participative.

Recife latest planning rules are represented in the Plano Diretor of 2008. This instrument introduces a more detailed zoning system than the existing in the previous tools but remains attached to the urban plot as the core unit for planning. The figures regarding the potential for construction and maximum densities are reduced in the city. However, there is a change in the way the area of development is calculated that reduces the impact of reduced building parameters.

In previous regulations when it was stated the building intensity (floor area ratio) it meant that the maximum construction in a plot included private and common areas. In the current instrument, parameters apply only to private areas. That fact combined with the larger number of mandatory parking units demanded by the law contributes to the creation of massive street plinths containing ground floors of buildings just to house cars.

Another change regarding this instrument is the regulation of the frontage of buildings; it is stated now that 70% of the front of a plot must be transparent, not allowing anymore the long blind walls that characterise large parts of the city. It is also defined that the requested green area of a plot should also be in the front setback. That represents a change in the visual aspect of the border between private and public spaces. However, this law hardly advances in providing the means to have a more active frontage.

2.5. HOW PLANNING INSTRUMENTS SET THE SPATIAL FRAMEWORK FOR URBAN TRANSFORMATION

The planning rules discussed here cover a relatively short time span regarding the history of the city. However, these rules have been responsible for controlling most of the formal urbanised area of the city. These instruments vary in complexity and scope. Still, some conclusions are possible, always trying to relate these plans or laws to their effect on the spatial configuration and restricting the findings to the most important aspects observed.

There can be identified a cycle of policies and legislation that go from a more generalist to more detailed approach. That can be the result of the fact that more detailed and elaborated laws like the one of 1961 that had a very fixed setting of typologies and parameters somehow constrained the action of real estate market. That constraint was reduced in the successive plans by a more general zoning of the city and in a higher dependency on spatial parameters to regulate the construction in the city.

What can be understood primarily from the analysis of law 16176 of 1996 and the instruments that followed it is that these tools are generalising the different spatial features of the city and relying exclusively on parameters that are usually insufficient to deal with the city complexity. Even the more complex zoning plans like the new Plano Diretor of 2008 still lacks some instruments to allow a better negotiation between public and private sector.

In that sense, prior tools like the 1919 law were more efficient as they provided clear elements to the negotiation to mitigate the impact of constructions of the limits stated in the law. Spatial solutions to deal with higher construction levels were embedded in the law; one example was the creation of public arcades to allow taller buildings. It is evident that the contemporary city and its scale of constructions involve much more questions than in the past, but modern instruments hand to private negotiations, and normally monetary compensations, the mitigation of projects with higher use than the parameters established in the law.

That is a clear result of what happened in a given moment where can be observed a dissociation between the instruments that regulate zoning and land use from those that deal with typomorphology. In short, more recent laws have set rules to be applied to the plot, restricting

building capacities in a more detached relation with the territory. Moreover, it is the result of the move from plans that envisioned a spatial configuration for the city, or at least to certain zones, to those that deal with the city based on the control of constructions in almost exclusively in a plot scale.

What has been described so far is that, in general terms, planning in Recife is reactive. The reading of planning instruments presented here shows that, in most cases, the tools could not cope with the pace that market operates and that the time necessary to adjust urban regulations leaves space for problems to persist even after their impact has been realised.

Most of the tools reviewed here deal with the allocation of different densities and functions in the city territory. However, the zoning of land uses was and still is to some degree more focused in the restriction of certain land uses than concerned in providing diversity in the city matrix of land uses.

3. PLANNING INSTRUMENTS AND THE DESIGN OF AN INTERFACE

Urbanites experience their cities in what we call the 'public realm'. It has a broader meaning than just 'public space'; it includes façades of buildings and everything that can be seen at eye level (Karszenberg et al. 2016). In this section, planning instruments will be codified using this notion of the public realm as a framework. The elements that compose this realm will be identified and observed in the different instruments that were employed in Recife in time.

Urban rules are in general associated with a design strategy. It is an attempt to codify concepts and delivery parameters that are sufficiently structured to guide the construction of a desired spatial configuration. *They represent creative acts that solve definite urban problems – and sometimes even create them* (Lehnerer 2009).

In the instruments analysed in the previous section, it was possible to identify the most common parameters used, how they have changed, have been simplified or made more complex, as laws were updated. In the table bellow, a synthesis of the parameters is presented.

| Law | 1051 | 7427 | 14511 | 16176 | 16719 | 17511 |
|-------------------------------|---------------------------------|---------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Year | 1919 | 1961 | 1983 | 1996 | 2001 | 2008 |
| Minimum setback (front) | null | null | 3 to 7 m | 3 to 7 m | 5 to 7 m | 5 to 7 m |
| Maximum height (total) | Related to street width | Related to street width | Defined per zone | Defined per zone | 12 to 25 floors | Defined per zone |
| Maximum height (plinth) | Not informed | Not informed | 6.0 m | 7.5 m | 7.5 m | 7.5 m |
| Floor area ratio (FAR) | Not informed | Not informed | Not informed | 1 to 5 | 1 to 5 | 1 to 3 |
| Building coverage ratio (BCR) | Not informed | 30 to 50% | 30 to 50% | Not informed | Not informed | Not informed |
| Green coverage | Not informed | Not informed | 25 to 50% | 25 to 50% | 25 to 50% | 25 to 50% |
| Parking demand | Not Informed | Not Informed | 01 parking at every 80m ² | 01 parking at every 40m ² | 01 parking at every 40m ² | 01 parking at every 40m ² |
| Frontage | Commercial use in certain areas | Commercial use in certain areas | Not Informed | Not Informed | Not Informed | 70% must be transparent |

Table 1 - Main spatial parameters identified in the laws.

The application of the parameters above has resulted in a series of different configurations regarding the building interface. As one can see in the table above, the change in the parameters is apparently subtle in most cases, but the spatial result can be extremely various. It is therefore expected that each of these profiles has a different impact on urban vitality. That reinforces the role of rules in the shaping of the urban setting and corroborates what Bernardo Secchi (Secchi 2015) says about the role of urbanism and planning devices. *"What changes down the history of the city is much more the regulatory sense and role of each device rather than the catalogue of devices, and it is through this regulating action that the city becomes a machine for social integration or exclusion as the case may be"* (Boano & Astolfo 2014).

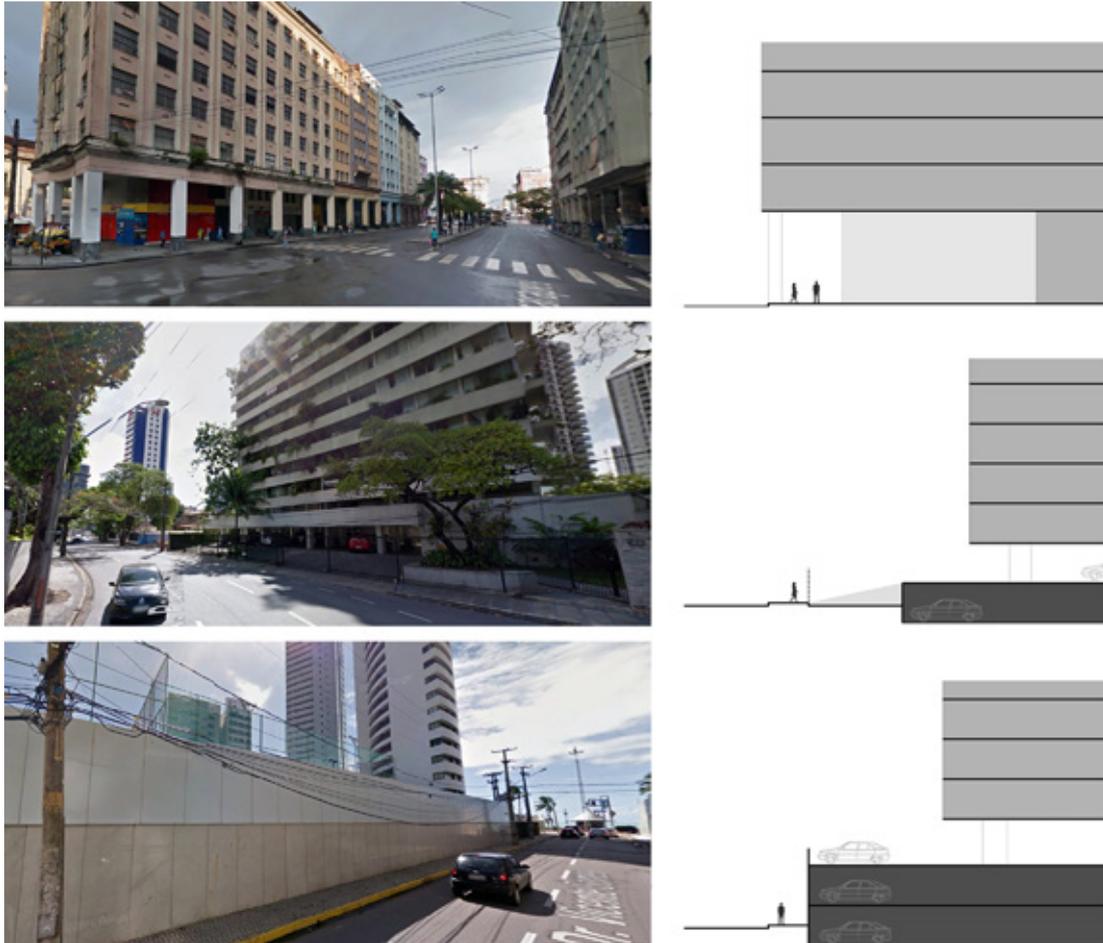


Figure 2 - Profiles selected for the analysis, urban gallery, pilotis and tower on podium. Source: Google Street View and (Carvalho Filho 2014).

Figure 2 shows three types of building-street interfaces used in this study. These typologies represent a considerable variation regarding spatial configuration on a micro-scale level. The first type is the urban gallery building. The urban gallery building has an active frontage towards the public street on ground floor level. The functions inside the building are well connected to the public street. The second type is the pilotis building, where the ground floor level consists of one open space typically used for parking or leisure. The building is standing on pilots, and, apart from a visual connection, there is no direct interface between the areas inside the building and the public street. Often these areas tend to be semi-private. The third type is the tower on the podium building, where the ground, the first and sometimes second floors are used as a parking garage. This kind of parking “podium” has no permeability and inter-visibility from the building towards the public street. It creates large blind walls and streets where no-one wants to stay, it has adverse results on street life, and it represents a long process of setting up a new private order (Caldeira 2000).

The following sequence of maps show both an angular choice analyses with a metrical high radius and a metrical low radius respectively and with the locations of the three typologies.



Figure 3 - Global angular choice with the location of urban gallery buildings (in white) Source: Author's own.

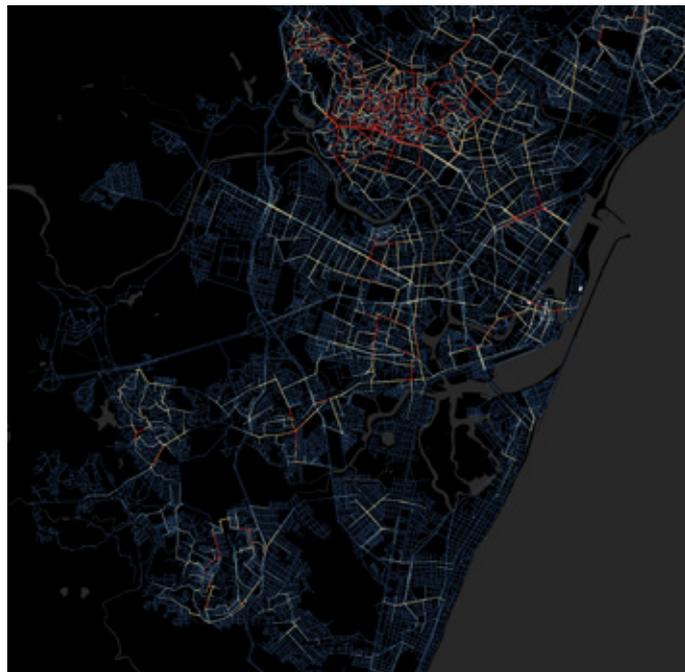


Figure 4 - Local angular choice with the location of urban gallery buildings (in white) Source: Author's own.

Figure 3 and 4 show angular choice analyses with a metrical high radius and a metrical low radius with the locations of urban gallery buildings. Buildings of this kind are located along highly integrated primary routes that are well connected to a city and neighbourhood scale. These buildings are not located in the highly locally integrated low-income settlements found on the hills, but in the neighbourhoods that have high local integration values. The urban gallery building contributes to street life due to both high integration on the street network as well as



Figure 5 - Global angular choice with the location of pilot buildings (in white) Source: Author's own.

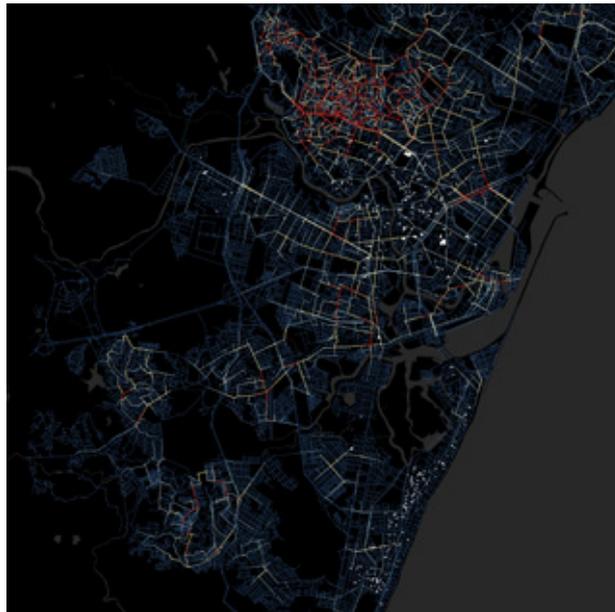


Figure 6 - Local angular choice with the location of pilot buildings (in white) Source: Author's own.

that a building type of this kind has an active frontage towards the street on ground floor level. The previous two figures show an angular choice analyses with a metrical high radius and a metrical low radius with the locations of pilots buildings. Buildings of this kind are located along segregated streets on all scale levels. Taking into consideration the weak natural surveillance mechanism between buildings and streets, the location of the pilot buildings scores very low on the degree of spatial integration and connectivity on macro as well as micro-scale levels.



Figure 7 - Global angular choice with the location of towers on podium (in white) Source: Author's own.

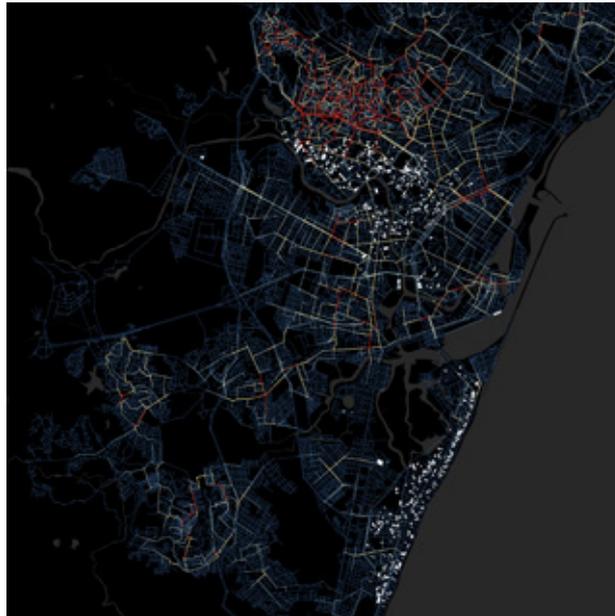


Figure 8 - Local angular choice with the location of towers on podium (in white) Source: Author's own.

The last type analysed, represented in Figures 7 and 8 has the lowest overall performance. In general, the towers on podium buildings are located along poorly integrated streets on local as well as city scale level. In addition, as mentioned before, this building type contributes to a disconnection between buildings and streets on a micro-scale level.

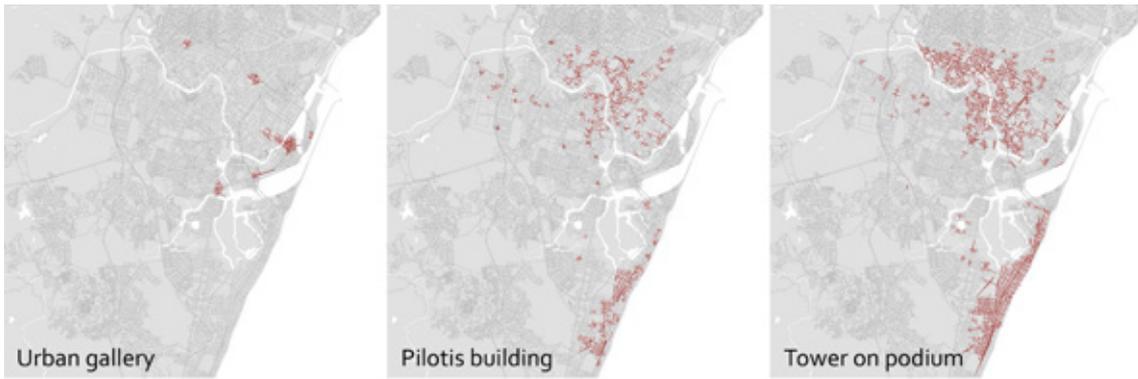


Figure 9 - Street segments connected directly to each building typology. Source: Author's own.

| | Recife | Urban Gallery | Pilotis Building | Tower on Podium |
|---------------|-------------|---------------|------------------|-----------------|
| Local | | | | |
| Min | 11 | 880 | 559 | 196 |
| Max | 734.310 | 235.192 | 176.900 | 192.924 |
| Mean | 15.992 | 2.512 | 13.844 | 13.627 |
| Global | | | | |
| Min | 9.753 | 63.431 | 42.965 | 40.198 |
| Max | 365.360.130 | 263.462.210 | 353.687.140 | 353.687.140 |
| Mean | 3.310.119 | 11.276.674 | 5.245.867 | 5.530.943 |

Table 2 - Summary of the values for angular choice

The next step is to reveal in detail how these three building typologies have an impact on street life through registrations of human behaviour and a fine-tuning of the microscale methods. For this paper, we focus on the spatial parameters for the building on the podium typology, as it represents the application of the current planning instruments and has been more recurrent in the city during the last decades.

3.1. SPACE SYNTAX AND THE LOCAL SPATIAL CONFIGURATION

Some characteristics of Recife emphasised in this research makes the analysis of the impact of the local configuration complicated for measuring the spatial factors for urban vitality. The most relevant issue, in this case, is that the city has been gradually transformed, mainly by the substitution of buildings. This process is not uniform, most of the time several types of construction can be simultaneously found in a single block. That shows how every set of regulations has affected building typology and that there is hardly any continuity line in the definition of spatial parameters embedded in the urban rules. That makes difficult the application, in the current case, of methods based on uniform contexts or planned areas to evaluate the effect of a local configuration to urban vitality.

In this regard, the micro-scale tools represent a set of analysis that allows us to have a first approximation on the contribution of space syntax in the formulation of urban rules. The procedure used here analyses a certain number of blocks in the city, evaluating their performance before and after the transformation of the building setting as a consequence of the application of the current urban rules. The features that have been compared are the topological depth between public and private spaces, the degree of inter-visibility of windows and doors, the level of constitutedness, the average floor area ratio and the average number of dwellings. This comparison of the performance of the features listed above uses data from the municipal cadastre complemented with average values from areas with a similar pattern of construction.

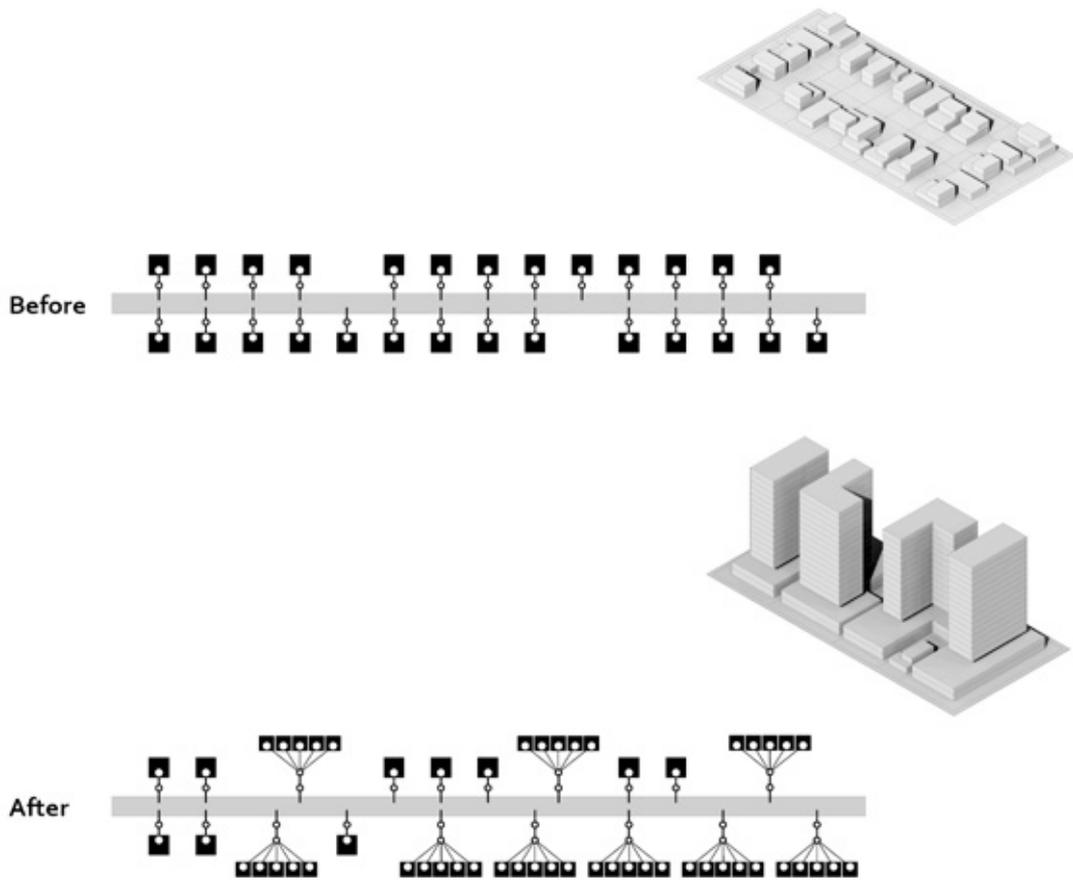


Figure 10 - Example of the analysis of the transformation on a street profile using micro-scale tools. Source: Author's own.

| Parameter (average) | Before | After |
|------------------------------|--------|-----------|
| Topological depth | 1 step | 2-3 steps |
| Inter-visibility | 85% | 20% |
| Level of constitutedness | high | low |
| Floor area ratio | 0,5 | 3,5 |
| Number of dwellings per plot | 1,5 | 25 |

Table 3 - Initial results of the study comparing 15 street segments in 03 areas.

One might expect that higher density in construction and an increased number of households would be beneficial for street life. However, that is not necessarily the case in Recife. This process of upscaling properties, as demonstrated here, contributes to reducing the interaction at ground level, as several front doors are replaced by one gate, and generally, no public function is provided at the base of these new buildings.

What is at stake here is the loss regarding adaptability and potential for the vitality that resides in a more fine-grained urban fabric. It is not the fact that small plots built with houses have already a diversity of functions, but they are considerably more adaptable than a single building where the plinth is frequently occupied with parking space (Carvalho Filho 2014).

In the next phases of this study, the samples will be expanded to include other types of street interface, and the effects on the street life of the different configurations will be assessed by comparing data regarding the location of micro-business, pedestrian counting and observations on site.

4. CONCLUSIONS

Some of the adverse effects on the micro-scale spatial relationships demonstrated here can be considered inevitable in the context observed in Recife of substitution of detached houses by larger buildings. Planning instruments frequently, with very few exceptions in specific zones related to nature reserves or historical areas, do not pose any restriction to merging of smaller plots. On the contrary, combining and upscaling plots is indirectly stimulated by regulations that make difficult to build on smaller terrains. In the construction regulations, initial setbacks and demands for parking are rather constant regardless the dimensions of the plot what restricts the densification in small parcels. In that case what would be the contribution of space syntax theory? As pointed out by van Nes and López (2007) urban developments are typically guided by high-density figures, and the degree of interconnectivity and the topological shallow public-private interface is often forgotten.

Examples of previous rules used in Recife show that it is possible to conciliate larger buildings with lively streets by the use of spatial devices such as the commercial galleries on the ground floor. The contribution of the methods employed here can be, by expanding the studied sample areas, and by relating the syntactic and morphologic analysis with the location of the micro business, pedestrian flows, to come up with thresholds that represent ideal conditions for street life. In other words, further research on the topic can clarify how incremental changes in the local urban configuration can bring benefits to the larger scale.

REFERENCES

- Alves, P.R., 2009. *Valores do Recife: O valor do solo na evolução da cidade*. 1st ed., Recife: Luci Artes Gráficas.
- Amorim, L. & Loureiro, C., 2003. Alice's Mirror: Marketing strategies and the creation of the ideal home. *Proceedings of the 4th International Space Syntax Symposium*.
- Boano, C. & Astolfo, G., 2014. The new urban question. A conversation on the legacy of Bernardo Secchi with Paola Pellegrini. *Planum Magazine*. Available at: <http://www.planum.net/the-new-urban-question-br-a-conversation-on-the-legacy-of-bernardo-secchi-with-paola-pellegrini-1> [Accessed December 20, 2016].
- Caldeira, T., 2000. *City of Walls: Crime, Segregation, and Citizenship in São Paulo*, Berkeley: University of California Press.
- Carmona, M., 2016. Design governance: theorizing an urban design sub-field. *Journal of Urban Design*, 21(6), pp.705–730. Available at: <http://dx.doi.org/10.1080/13574809.2016.1234337>.
- Carvalho Filho, L., 2014. *Is There a City Beyond the Buildings? Searching for Urbanity in Recife*. TU Delft. Available at: <http://tinyurl.com/jdnrx5w>.
- Carvalho Filho, L. et al., 2015. The Capibaribe Park: Restructuring the urban fabric of the city of Recife by articulating public spaces. *Proceedings of the 10th International Space Syntax Symposium*, pp.1–17. Available at: http://www.sss10.bartlett.ucl.ac.uk/wp-content/uploads/2015/07/SSS10_Proceedings_063.pdf.
- Feldman, S., 2001. Avanços e limites na historiografia da legislação urbanística no Brasil. *Revista Brasileira de Estudos Urbanos e Regionais*, (4), pp.33–47. Available at: <http://www.anpur.org.br/revista/rbeur/index.php/rbeur/article/view/55>.
- Figueiredo, L., 2012. Desurbanismo: um manual rápido de destruição de cidades. *Urbanidades*, pp.209–234.
- Gkanidou, P., Austwick, M. & Hanna, S., 2015. Classification of areas through quantifiable spatial attributes. *Proceedings of the 10th International Space Syntax Symposium*, p.149:1-149:14. Available at: <http://www.sss10.bartlett.ucl.ac.uk/proceedings/>.
- Hillier, B. et al., 1993. Natural Movement: or, configuration and attraction in urban pedestrian movement. *Environment and Planning B: Planning and Design*, 20, pp.29–66.
- Hillier, B., 2009. Spatial Sustainability in Cities: Organic Patterns and Sustainable Forms. *Proceedings of the 7th International Space Syntax Symposium*, pp.1–20. Available at: <http://eprints.ucl.ac.uk/18538/>.
- Hillier, B., 2013. The Now And Future Of Space Syntax: From structures and models to theory. *Proceedings of the Ninth International Space Syntax Symposium Seoul*.
- Karssenbergh, H. et al. eds., 2016. *The City at Eye Level: Lessons for Street Plinths* 2nd ed., Delft: Eburon Academic Publishers.
- Lehnerer, A., 2009. *Grand Urban Rules* 1st ed., Rotterdam: 010 Publishers.
- Medina, L.L., 1997. Lei de uso e ocupação do solo do Recife como instrumento de desenho urbano.pdf. In *Encontros Nacionais da ANPUR*. pp. 540–566.
- Monteiro, C. & Cavalcanti, R., 2015. Spatial profiles of urban segments : Assessing place vulnerability to crime. *Proceedings of the 10th International Space Syntax Symposium*, pp.1–17.
- van Nes, A. & López, M.J.J., 2007. Micro Scale Spatial Relationships in Urban Studies: the relationship between private and public spaces and its impacts on street life. *Proceedings, 6th International Space Syntax Symposium, Istanbul*.
- Netto, V., Saboya, R. & Figueiredo, L., 2012. The Convergence of Patterns in the City:(Isolating) the effects of architectural morphology on movement and activity. *Eighth International Space Syntax Symposium*, pp.1–32.
- Pont, M.B. & Marcus, L., 2015. What can typology explain that configuration can not? *SSS10 Proceedings of the 10th International Space Syntax Symposium*.
- Secchi, B., 2015. *La Ville des Riches et la Ville des Pauvres: Urbanisme et Inégalités*, Geneva: Metis Presses.