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CURITIBA AND ITS URBAN LINES:

From 1857 to 1988

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ABSTRACT

To analyse the city in relation to its history, through its transformations, means also to understand the society itself. That is, the city, its connections, streets, public spaces, reveal the identity of the society. This paper explores the urban evolution of the city of Curitiba, Brazil, by historical and configurational data, from the historic downtown plan from 1857, until the more consolidated city plan in 1988. These maps were selected based on the key historical urban planning facts of the city. The theoretical background of the research is based on Space Syntax Logic (Hillier and Hanson, 1984; Hillier, 1996). This paper was organized in two moments: at first, a series of historic maps of the city of Curitiba was developed; after that, the axial maps were drawn and read. The structure of the urban street grid was analysed based on the accessibility and centrality data, through the global and local integration. This paper shows the consolidation of planning decisions with the visualization of accessibility arrangements and its connections, historically formed. When Analysing this information, it was possible to recognize the emergence of structural axes North-South and East-West, which are the most known results of the urban planning in Curitiba.

KEYWORDS

Space Syntax methodology; urban plans; city of Curitiba; urban integration

1. INTRODUCTION

The objective of this study is to understand the formation of the city of Curitiba through the analysis of its lines of integration (spatial syntax), based on its historical maps from 1857 to 1988.

To understand the city linked to the historical time, through its transformations, means to understand the society itself. In fact, it is in the city, on its connections, on its streets, in its

generated spaces, that society itself is materialized. Such study of the past also serves as a measure of comparison with the present and the future. This time – materialized by the dispute of spaces, interests, economic, social, and political issues etc.; is registered in many ways in the city, one of them, at the urban level, being the historical cartography. As said by Rossi (2001), “The shape of the city is always the shape of a time of the city, and there are many times in the shape of the city” (p.57).

The understanding of the city from its growth helps to obtain an overall scenario, since according to Panerai (2006), this type of analysis when linked to maps and field survey ends up relating the strength lines of the geographical territory with large traces that organize the urban agglomeration.

Understanding the process of urban growth is important because it provides us a global apprehension of the agglomeration in a dynamic perspective. [...]. In revealing the fixed points of previous transformations, the study of growth allows one to determine those logics deeply inscribed in the territory that clarify the reasons of being the current settlement. To begin the analysis of a city by the study of its growth is one of the means of apprehending it as a whole, in order to determine the direction of further detailed studies. (Panerai, 2006, p.55)¹

Bearing in mind these considerations, this paper was organized in three parts. The first one, describes the methodological procedures adopted; the second one, presents the detailed analysis of the geometry of the urban trajectory in the pre-selected historical periods of Curitiba City; and finally, the third part reveals the urban transformations occurred in the city from the description of the respective configurational properties from the point of view of Space Syntax.

2. READING CURITIBA: SPACE SYNTAX AS THEORY AND METHOD

The method of analysis adopted departs from historically situated urban contexts and develops from the relation between the characteristics of the morphological and functional elements and the configurational properties.

Space syntax was developed in the 1980s as a descriptive theory of space (Hillier and Hanson 1984). It proposes a fundamental relationship between the configuration of space in a city and the way that it functions. The analysis of the spatial configuration enables the identification of potential integration or segregation of each element in the system. These variables are calculated based on graph theory and, moreover, the actual morphological computation is based on the associated graph of the axial map (Hillier and Hanson 1984). The syntactic reading shows that integrated axes are the ones from which the other axes in the system are easier to reach. In average, they require shorter topological paths to be accessed from any axis in the system. These tend to assume dominant positions within the system, and to show higher numbers of pedestrian and vehicular flows.

The axial map is processed on Depthmap software (© UCL, 2010), in order to convert the city axes to a graph, that allows extracting both graphic and numeric outputs. The graphic output consists of an axial map with a colour gradation, in which warm colours represent more integrated axes, and colder colours more segregated ones. This process allows a direct comparison among the urban evolution maps, reducing them to a common basis. The cities of Curitiba and Lisbon were analysed in terms of their hierarchized structure, that is, their degree of topological accessibility. Axial maps and the values of global and local integration were chosen as analysis categories.

1 In the original text: “Entender o processo de crescimento urbano é importante porque nos oferece uma apreensão global da aglomeração numa perspectiva dinâmica. Ao revelar os pontos fixos de transformações anteriores, o estudo do crescimento permite determinar aquelas lógicas inscritas profundamente no território que esclarecem as razões de ser do assentamento atual. Começar a análise de uma cidade pelo estudo de seu crescimento é um dos meios de apreendê-la em sua globalidade, a fim de determinar o sentido a dar a estudos ulteriores mais detalhados.” (PANERAI, 2006, p.55)

The theoretical, methodological, and framework procedures of this piece of research were based on two points: (a) systematic collection of data and specific information, which assisted in the construction of the historical series of maps of the city of Curitiba; (b) production of axial maps from the base maps collected, followed by configurational analysis, taking the Theory of Social Logic of Space or Space Syntax as reference (Hillier and Hanson, 1984; Hillier, 1996).

In relation to the first point, the historical cartography of the city of Curitiba has a collection of more than fifty maps. They appear irregularly spaced until the 1960s, and, thereafter, there are annual records, with the gradual increase of new technologies, such as aero photogrammetry, and CAD databases, for example. Based on this panorama, six maps were selected following the criteria of completeness and clarity of information, and the capacity to demonstrate significant planning decisions.

The first one, from 1857, brings the record of the first existing urban configuration; the second one, from 1894, illustrates the growth of the city to the southern region and its configuration in the late nineteenth century; the third one, from 1914, shows the urban expansion of the beginning of the century, a period of significant economic growth; the fourth one, from 1935, shows the city before the first Master Plan, the Agache Plan, with macro characteristics in terms of urban planning; the fifth one, from 1962, records the transformations of the previous plan and represents a record of the city before the propositions of the SERETE - Wilhelm Plan, a plan that changed the urban logic of Curitiba in terms of development in a significant way; and, finally, the sixth map, from 1988, consolidates the modifications of the previous plan, which was the last great intervention in structural terms, in the planning of the city.

The second point that based the methodology of this paper, that is, reading Curitiba from the syntactic analysis, aimed to reveal attributes of the Curitiba urban system in the selected historical maps. This system was evaluated for its hierarchical structures, or its gradation of topological accessibility. The evaluation criteria adopted for these readings were the axial maps, through their global and local integration value, using the Depthmap software.

When observing the sequential axial maps of a city, according to the pattern of the streets, it is possible to evaluate from the average "integration value" which period presented better or worse degrees of ease of displacement. Even more, it is also possible to note how the integration averages are transformed over time to the same urban nucleus, towards an urban network that is more favourable, or not, to the movement. From these measures, other variables of interest derive, such as the integration core, which consists of the set of the more accessible axes of a system, generally corresponding to the set of red lines. Such areas tend to coincide with the so-called active urban centres, that is, places where flows and distinct uses are converged in quantity and diversity.

In short, as a guideline of the analysis, the maps will be presented preceded by basic historical information linked to urban planning, and later, they will be appreciated according to the relations between history and axial maps. The map presentation will have the following sequence: at the top of the figures there are the integration maps, the global one to the left and the local one to the right, and at the bottom of the figures there is the historical map to the left, followed by a picture from the selected historical period.

3. HISTORY AND THE URBAN CONFIGURATION OF CURITIBA

Capital of the state of Paraná, Curitiba is geographically located in the southern part of Brazil and it has 1,746,896 inhabitants (IBGE, 2010). It is a city that, throughout its history has passed through a series of Letters, Codes of Postures and Master Plans that shaped its urban structure and its form of growth. Such Decisions, as already explained, left their records in the urban network and in the structuring of the city itself.

Curitiba was officially founded in 1693, when the city council was installed and the pillory was reinstalled. At that time, the city already had a central square with a church and only a few buildings in its immediate surroundings. It was elevated to the category of Vila in 1721, time in which the concept of city required by the Portuguese crown was implemented. However,

it remained stagnant for more than a hundred years, until its elevation to the Capital of the Province of Paraná, in 1854, a period in which the process of regular urban growth began and acquired a rapid increasingly rhythms as the twentieth century came. As it will be shown in the sequence of the text, the map of 1857 presents a city still undeveloped around its original nucleus (square and church), but it already had determinations in Book (created by the colonial official Ouvidor Rafael Pires Pardiniho), and later by the Code of Postures of 1829 (developed by the inspector general of public lands Eng. Pierre Taulois) in relation to the necessary rectilinear alignment of the streets and their growth in orthogonal grid.

Constituting a city that still maintained a very close relationship with the rural area; the 1857 map shows the lines of only a few roads around the central square (Praça Tiradentes). This lines were formed by the connections of the city with the neighbourhoods, and still without visible concern related to its regularity (Fig. 01).

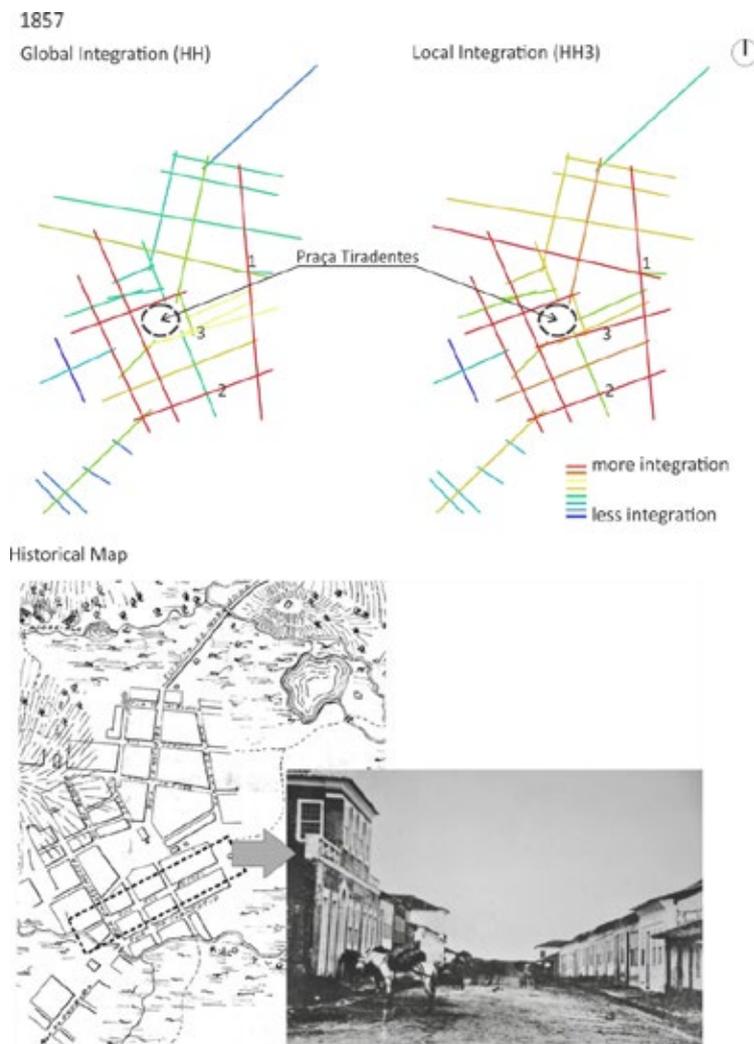


Figure 1 - Curitiba 1857 - At the top: Global and Local Integration Maps, At the bottom: Historical Map of 1857 and a picture of the Flowers Street, from approx. 1860 (current XV de Novembro Street).

Font: Axial maps: Authors, Historical maps: IPPUC, 1857, Picture: Without author, 1860, filed in Casa da Memória.

It was obtained an average integration value of 1.67, with Carioca Street (1) being the most integrated one, (current Riachuelo Street). This street was one of the paths that connected the old and isolated village of Curitiba, recently transformed into capital of Paraná Province, to the coast, followed by Commerce Street (2) (current Marechal Deodoro Avenue). It was detected in this analysis a strong relationship of the 4 axial lines as being more integrated around the Tiradentes Square, forming a core of integration that merges with the founding nucleus of the city itself. Comparing the global and local integration maps, it can be seen that in the first one the most integrated ways were in the North-South direction, while the local integration shows dominance in the East-West axis. A local integration (HH3) that, due to the small number of streets in the urban nucleus of that time, keeps the Carioca Street (1) as the most integrated one followed by its transverses streets.

Following the historical process, one of the main inducers of the urban development of Curitiba was the Railway connecting the capital to the coast, Paranaguá – a port city. This connection was responsible for the disposal of agricultural products and supply of other products to the capital. The positioning of the Railway Station, inaugurated in 1885, about 800 meters south of the urbanized area, catalysed the growth, increasing the area between the Station and the City Centre (Dudeque, 2010) (Fig. 02).

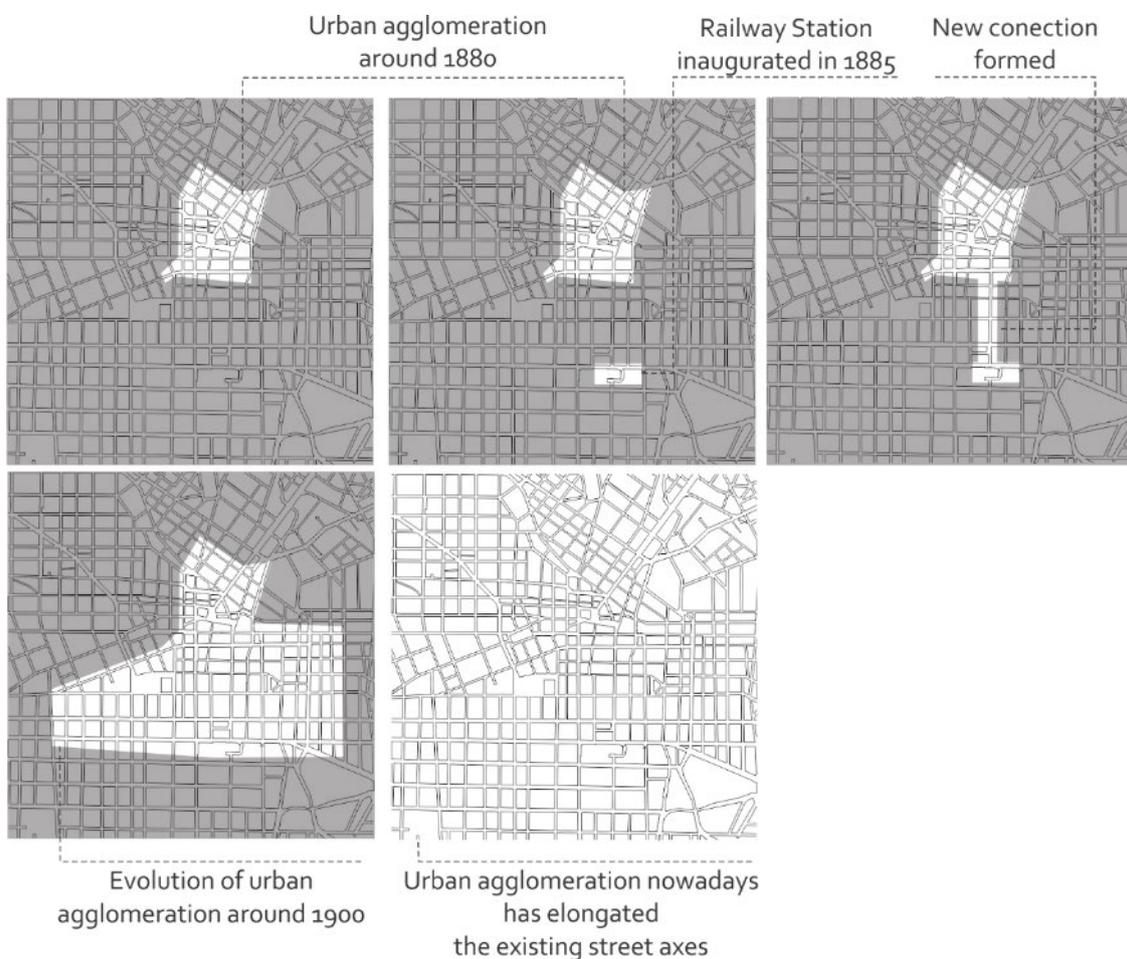


Figure 2 - Implantation of the Curitiba Railway Station - Schematic Maps

Font: Adapted from Dudeque, 1995, p.161 a 165.

The development of this region was consolidated by the New Curitiba City Plan, from 1886 (developed by the Italian Engineer Ernesto Guaita). In this plan, the routes were proposed in the East-West direction, being perpendicular to the Railway Station, and, from them, the delimitation of an orthogonal grid for urban growth was established. The 1894 map already records the growth towards the south and the consolidation of the urban network that connects the founding City Centre. (Fig. 03)

At the end of the 19th century and beginning of the 20th century, the City Centre is consolidated as the most urbanized and dynamic area, and the growth lines that followed the roads responsible for connecting the mills gradually began to be structured and to receive urban improvements. As reported by Garcez (2006), in the south, near the railway station, the factories of beer, matches, power plants, processing industries, etc. proliferated. At that time, the "Flowers Street" ("Rua das Flores", current XV de Novembro Street) (1), was consolidated as the city centre, being its main artery (fig. 03).

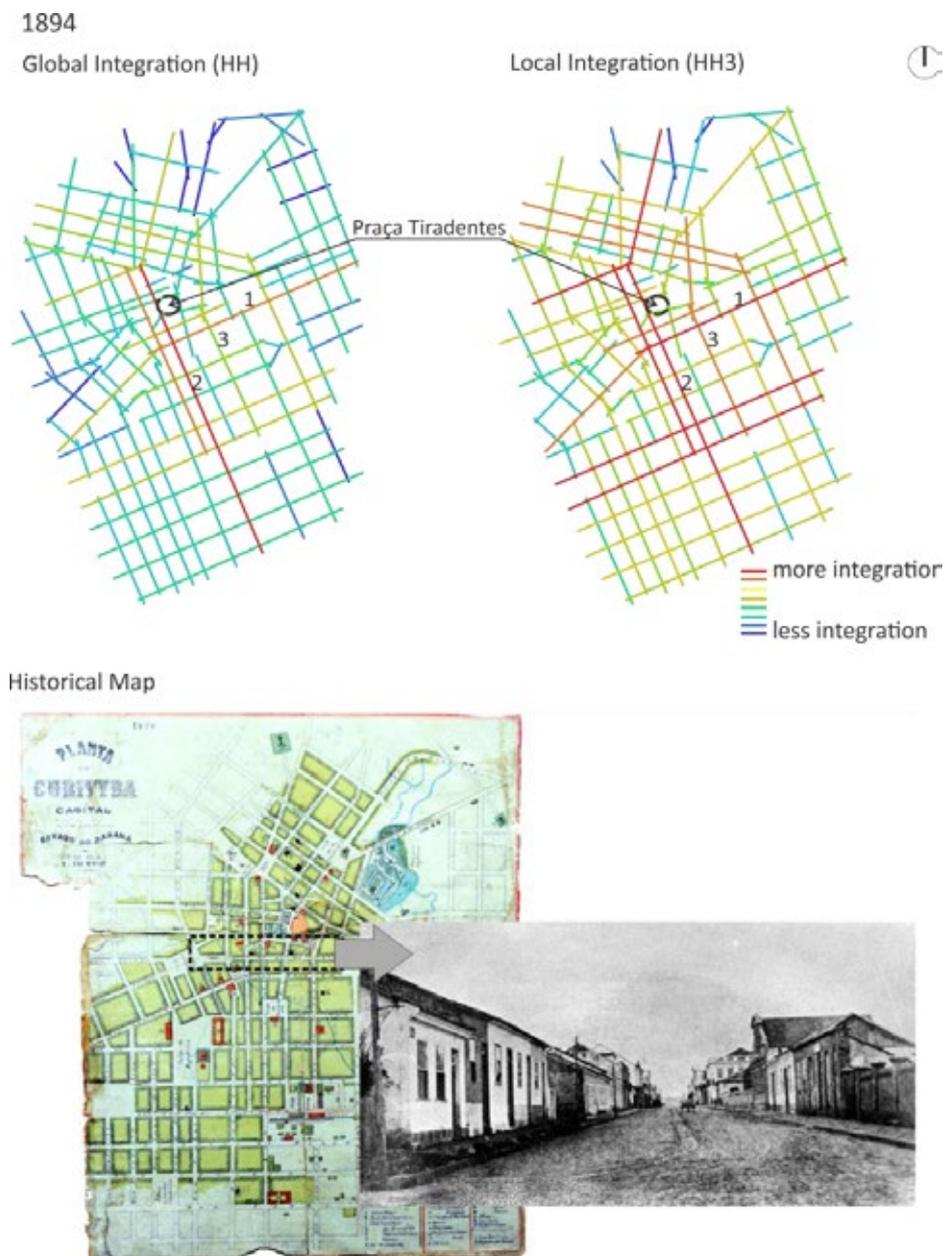


Figure 3 - Curitiba 1894 –At the top: Global and Local Integration Maps, At the bottom: Historical Map of 1857 and picture of the Flowers Street, approx. 1900 (current XV de Novembro Street). Font: Axial maps: Authors, Historical maps: IPPUC, 1857, Picture: Without author, 1900, filed in Casa da Memória.

In the 1894 global integration map (Fig. 03), it can be observed that the most integrated street - Marechal Floriano Peixoto Avenue (2) longitudinally encompasses the orthogonal network of the system as a whole, connecting the centre to the station. This system of 97 axial lines, with an average integration value of 1.99, shows, in a certain way, that the current Barão do Rio Branco Street (3), which begins in front of the station towards the centre, does not have its importance materialized by the analysis. The core of integration, in this period, is practically represented by the Marechal Floriano Peixoto Avenue (2).

In a similar manner, in relation to the local integration, it can be noticed that the Marechal Floriano Peixoto Avenue (2) is still more integrated, followed by a parallel and a transversal street. It is observed that in both global and local integrations the more integrated pathways depict an orthogonal structure in elongated lines, linked to the central square (Praça Tiradentes - ground zero), but departing from that to a wider environment, also encompassing the Railway Station.

In the late nineteenth and early twentieth centuries, the immigration from European nations was intensified, increasing expressively the number of people in the city and in areas around the urbanized zone, beginning to create colonies in spaces that are consolidated districts today. As consequence, there was also a significant increase of infrastructure, with more structured public services for water supply, sewage treatment, telephony, lighting and urban transport service.

The increase in urban vitality can be seen in the picture of the Largo da Ordem in 1910 (Fig. 04), which shows a religious event and the eclectic architecture (in the centre).

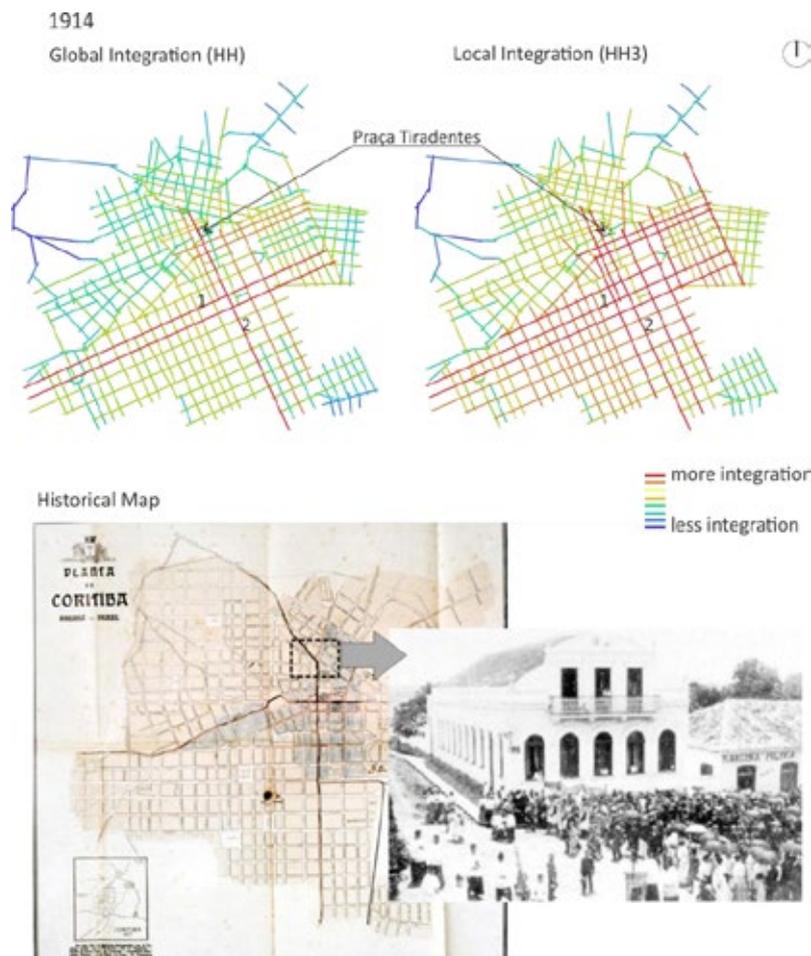


Figure 4 - Curitiba 1914 –At the top: Global and Local Integration Maps, At the bottom: Historical Map of 1914 and picture of the Largo da Ordem, 1910.

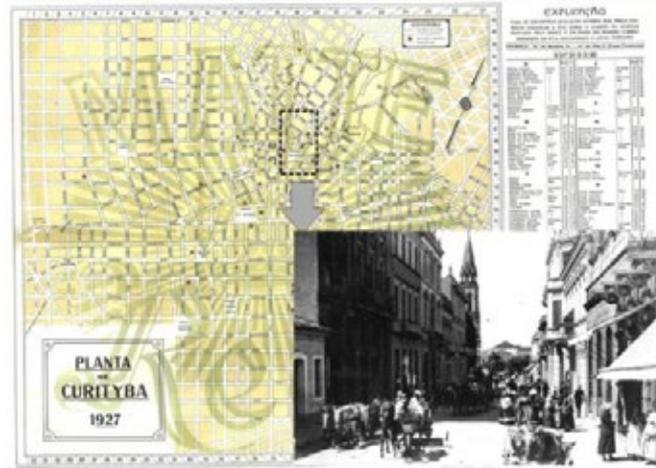
Font: Axial maps: Authors, Historical maps: IPPUC, 1914, Picture: Without author, 1910, filed in Casa da Memória.

The 1914 map already shows the consolidated growth to the west and south of the Railway Station, and it can be already seen the “stitching” of some points that still needed structuring in the previous maps. However, it may be also perceived the projection of a growth to the north of the city, a region not yet consolidated. The axial structure is consolidated in the orthogonality with a system of 205 axial lines. From these, the average integration value was 1.89 and the most integrated route was Visconde de Guarapuava Avenue (1), followed by Marechal Floriano Peixoto Avenue (2). Thus, we can perceive the result of the New Curitiba City Plan proposition, that is, there are more integrated routes to the south of the original nucleus area. In this period, The integration nucleus is represented by three axial lines, forming a cross. This formation ends up materializing the intention of Ernesto Guaita, regarding the East-West growth determined from the Railway Station. The local integration also strengthens the structure in cross, but in both directions: east-west and north-south.

The growth process led to the consolidation of the central area, with the Flowers Street (now XV de Novembro Street), being one of the most urbanized area. At this time, more precisely in 1919, in a further attempt to order urban growth, a new Code of Postures was approved. Among its determinations there was the delimitation of the city in three zones: The City Centre area, the Suburban area (in the surroundings of the centre) and the Rossio (rural area). Each of these areas should follow a specific regulation, mainly regarding the use and occupation of the soil. This moment is considered by some authors as the effective beginning of urban planning of the city. It was An era that was also marked by the concern with health issues arising from the growth (development of a preliminary plan for sanitation of the city by the Health Eng. Saturnino de Brito), which became even more evident in the middle of the century.

This city, which hardened its rules in a time when customs and even urban life were being consolidated, can be seen in the image of José Bonifácio Street in the 1920s (Fig. 05 – compared here with the map of 1927 because of its temporal proximity to Historical image - map not included in the syntactic analysis). The small road, next to the Cathedral, which dates back to the early days of the city, shows a great urban vitality at that time, with people walking down the street and sidewalks, groups talking under the awnings that are characteristics of the shops, carts carrying people, etc.

The result of these decisions can be seen in the 1935 map (Fig. 05). It demonstrates a greater density around the region formed by the historical centre and railway station, where the most integrated lines of the system occur. A dense and compact configuration can be observed, represented by 722 axial lines, with an average integration value of 0.65, and with the most integrated route being the Marechal Floriano Peixoto Avenue (1), followed by the Visconde de Guarapuava Avenue (2) and XV de Novembro Street (3). This historical moment is interesting because it represents, after the 1857 map, the only occurrence of a densification with so many lines with close and elevated integration values, characterizing a core, also dense, with great levels of connectivity distributed in a balanced way. In this time the core of formation - and, why not, the geometric center also - coincides with the topological core. As regards the local integration, it can be seen the formation of two topological sub-centers, east-west directions, connected by a third, the north-south (Fig. 05).



1935

Global Integration (HH)

Local Integration (HH3)



Historical Map



planned streets



Figure 5 - At the top: 1927 Map and José Bonifácio Street, 1920s. Middle: Curitiba 1935 – Global and Local Integration Maps, At the bottom: Historical Map of 1935 and picture of the Hindenburg overflying the XV de Novembro Street, from 1936.

Font: Axial maps: Authors, Historical maps: IPPUC, 1927 / 1935, Picture: without author, 1936, filed in Casa da Memória.

The urban denseness and the growth of the city, identified in the previous map, also brought a series of problems. In order to solve them, the French urbanist Alfred Agache was hired, who was already working in other Brazilian cities, to draw up a new Urban Plan. The structure proposed by him was based in the centre of the city as the radiating nucleus of a series of routes that connected this central area with the surrounding areas. These routes were classified as perimeter routes (bypassing the centre radially), radial routes (interconnecting the perimeter routes in the centre-neighbourhoods direction), and a diametrical avenue, crossing the city in the east-west direction. In addition, the Plan also established a series of Functional Centres (for example: civic centre, sports centre, commercial and social centre, industrial centre, etc.) each one following, as far as possible, functional vocations that were being developed through time in several areas of the city. Above all, Agache emphasized the identity of Curitiba, not very representative for a capital with the importance it was acquiring in the national scenario. The 1935 map showed a moment previous to the reforms proposed by the Plan. It was a city that, as we can see, was still compacted around its original enlarged nucleus, with some roads beyond these limits and connecting the city to the neighbouring municipalities.

As a practical result, the Agache Plan left some broad avenues, the Civic Centre in its planned place and the implementation of some radial avenues that ended up being the base of the subsequent Plan. The 1962 map (Fig. 06) shows these materializations and also demonstrates the great expansion of the urban grid in about 20 years, whose routes already exceeded the limits of 1935.

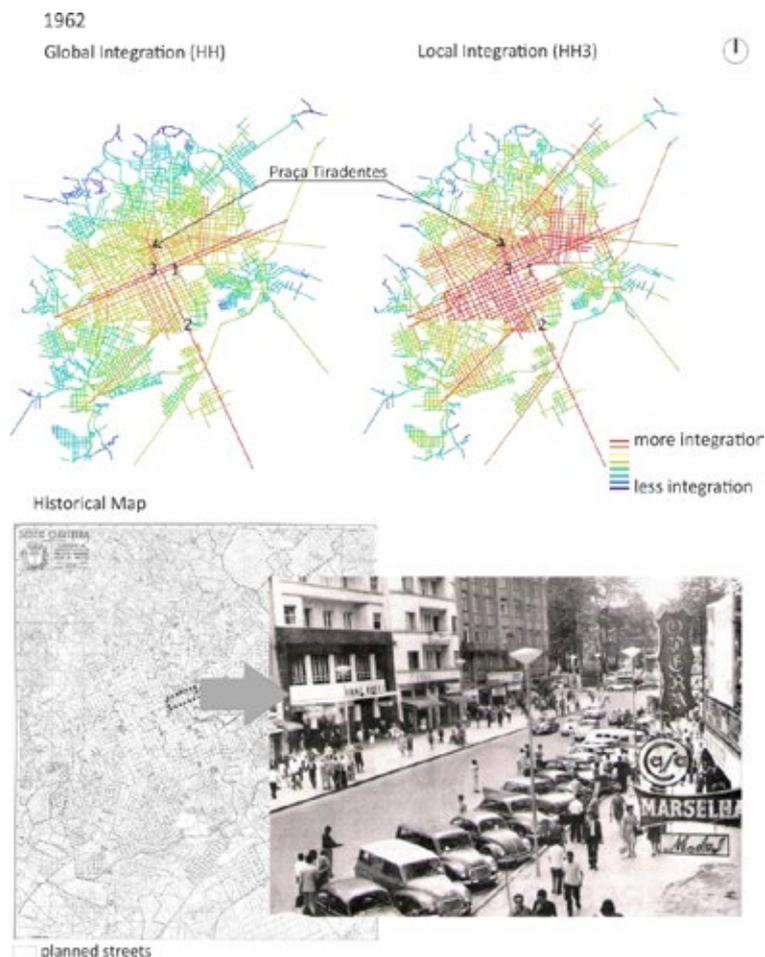


Figure 6 - Curitiba 1962 – At the top: Global and Local Integration Maps, At the bottom: Historical Map of 1962 and picture of the “Boca Maldita”, from 1967.

Font: Axial maps: Authors, Historical maps: IPPUC, 1962, Picture: Without author, 1967, found at <http://curitibaantigamente.com/> (accessed 20/01/2017).

The axial map shows that the dense and compact configuration lost some strength, diluting the more connected routes to an extended environment, and better distributing the hierarchy between them. However, it still shows a relationship between the foundation core, geometric centre and topological centre. This system had 1254 axial lines, with an average integration value of 1.16. The Sete de Setembro Avenue was the most integrated street, with an axis increasingly strengthened, followed by the Marechal Floriano Peixoto Avenue and the Visconde de Guarapuava Avenue. The integration nucleus, in this period, reinforces the cross structure, a sign of the expansion of the urban network that was taking shape, but, the reading of local integration, besides reinforcing the centrality of the training centre, makes clear the formation of new sub-centres to the northeast and southwest.

In 1965, in the name of the outdated Agache Plan, after a competition among several companies, the company SERETE, with the participation of the architect and urbanist Jorge Wilhelm, was responsible for the elaboration of a new Master Plan. The basis of his proposal was the transformation of the radial growth system into a linear growth, using the existent and structured roads by the previous plane routes (Fig. 07). In order to do so, it was proposed the densification along these axes, the known structural axes. In addition, it was sought the development to the southwest with the implantation of the Industrial City, relocating the previously area destined for that (in the southern region of the railway station).

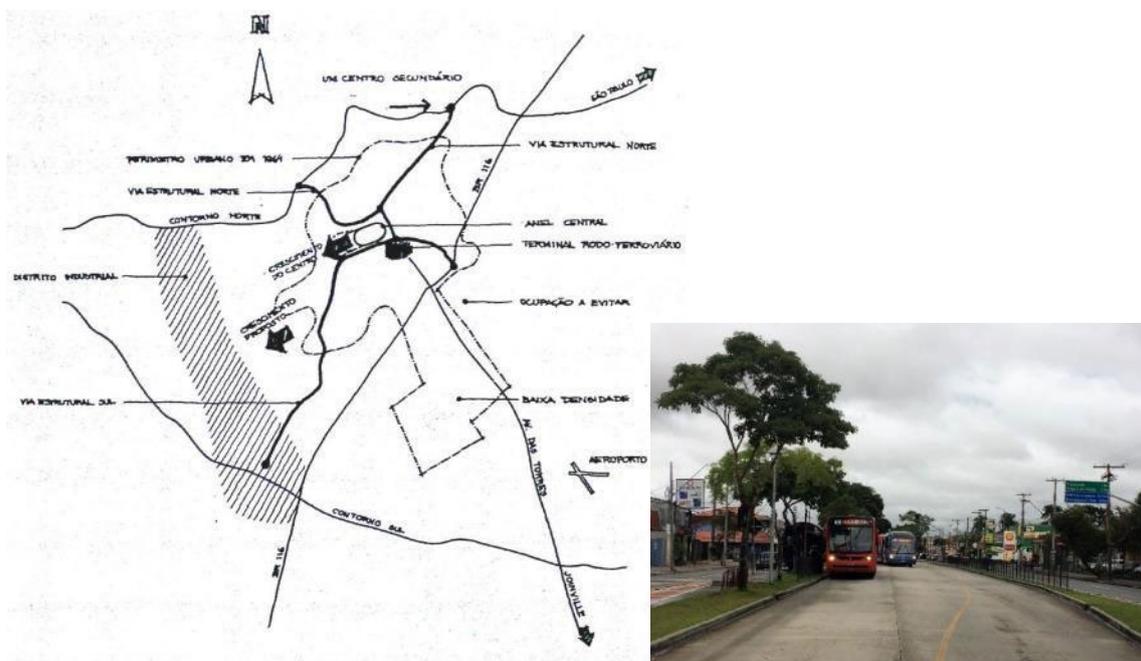


Figure 7 - Left: Structure of the Urban Plan proposed for Curitiba, 1965. Right: Picture of Marechal Floriano Peixoto Avenue (one of the most important axes of the city, it was not planned to be a structural route back in 1970s).

Font: Skecth: WILHEIM, 1965, P.12 and Picture: Authors, 2017.

The map of 1988 (Fig. 08) already brings the consequences of this Plan. That is, a city with an urban network practically consolidated and close to reach the limits with the neighbouring municipalities.

The decisions of the SERETE-Wilhelm Plan, such as the strong densification around the North-South axis (much more consolidated to the south) and significantly in the East-West direction, are clear in the 1988 axial map (Fig. 08). The system now, almost ten times greater than the 1962 map, has 11509 axial lines, with an average integration value of 0.82, with the most integrated street being the Marechal Floriano Peixoto Avenue, followed by Sete de Setembro Avenue and Visconde de Guarapuava Avenue. These avenues play an important hierarchical role within the

system, representing great potential for movement. The core of integration, in this period, continues to present a structure in cross, but tending to consolidate it along its axes and, in a way, leading to the gradual detachment of the geometric centre with the topological cent.

It can be seen in Figure 08, in the Local Integration - HH3, there are nine points with a certain concentration of lines in red colour. These lines present significant attractiveness, defining, in fact, the hierarchical structure of the Curitiba system. Moreover, it reveals a high correspondence between the potential of the map and the actual situation investigated. It should be noted that, four "sub-centres" are located along the structural axes. These are the central axes within the planning conception of Curitiba; all of them are contemplated by terminals of integration of collective transport, where various types and sizes of services and trades are inserted.

As regards the two centralities - Bairro Sítio Cercado and Bairro do Cajuru, the regions that presented the highest values of local integration, are exactly the centres of commerce and services of these districts. In relation to the centrality of Alto do Rua XV de Novembro, it is a region in consolidation with a strong gastronomic vocation.

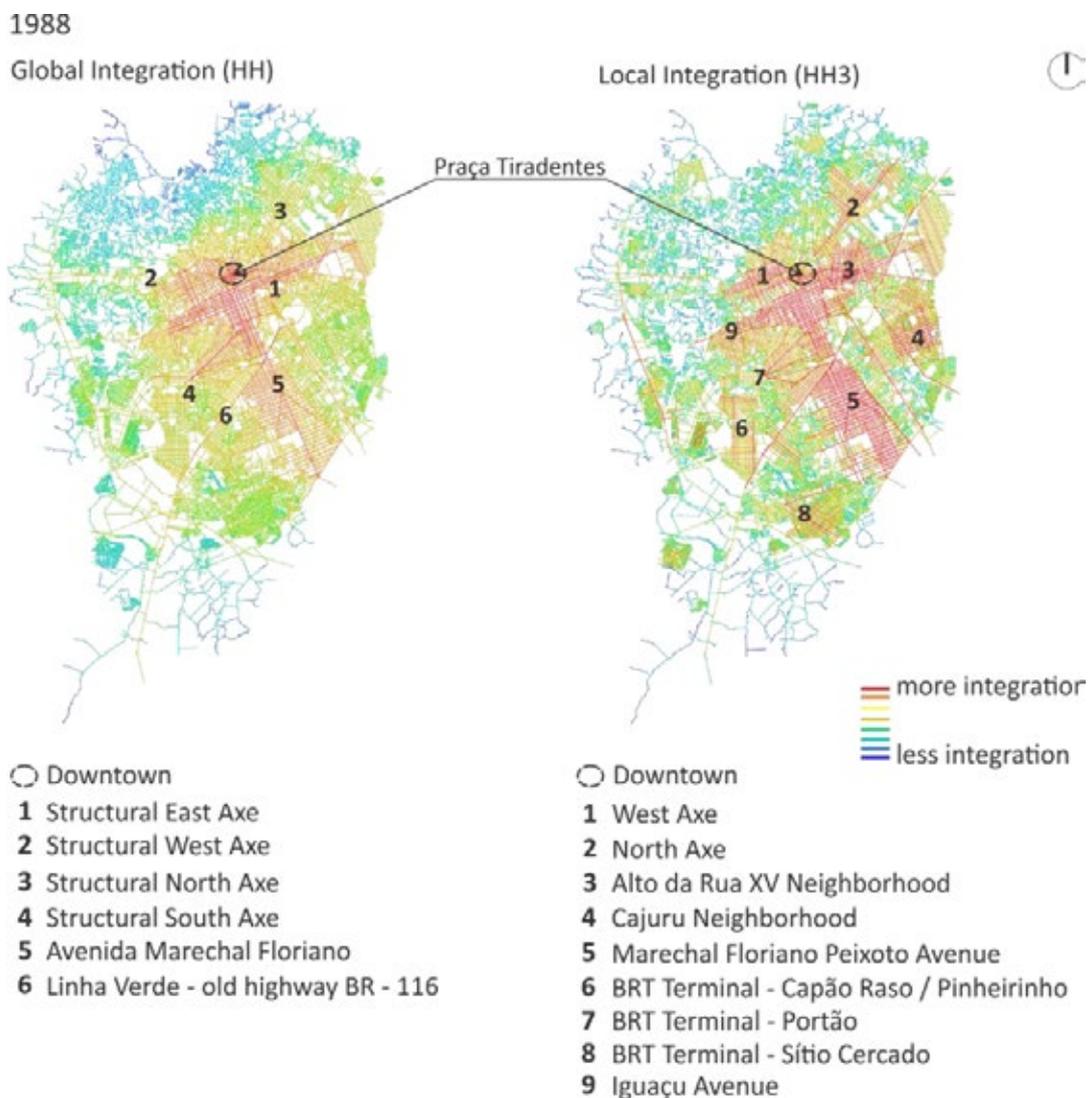


Figure 8 - Curitiba 1988 – Global and Local Integration Maps.

Font: Authors.

With the urban limits practically consolidated, the interventions in the next years were practically restricted to some larger constructions, with more symbolic than structuring content in terms of the urban network. What is perceived, in this case, is only the densification of some regions of the city, which can be seen nowadays.

4. URBAN TRANSFORMATIONS IN THE LIGHT OF SPACE SYNTAX

In a way, the growth of the urban area of Curitiba City maintains a certain regularity in terms of territorial expansion, presenting two moments of break, in which this territorial expansion occurs in a more accelerated way. As shown in Figure 09, the first break occurs with the implantation of the Railway Station, a planned growth induction (spots 1857 and 1894). The second moment of great expansion already appears in the most recent history of the city, in the period of implantation of the SERETE – WILHEIM Plan (spots 1962 and 1988).

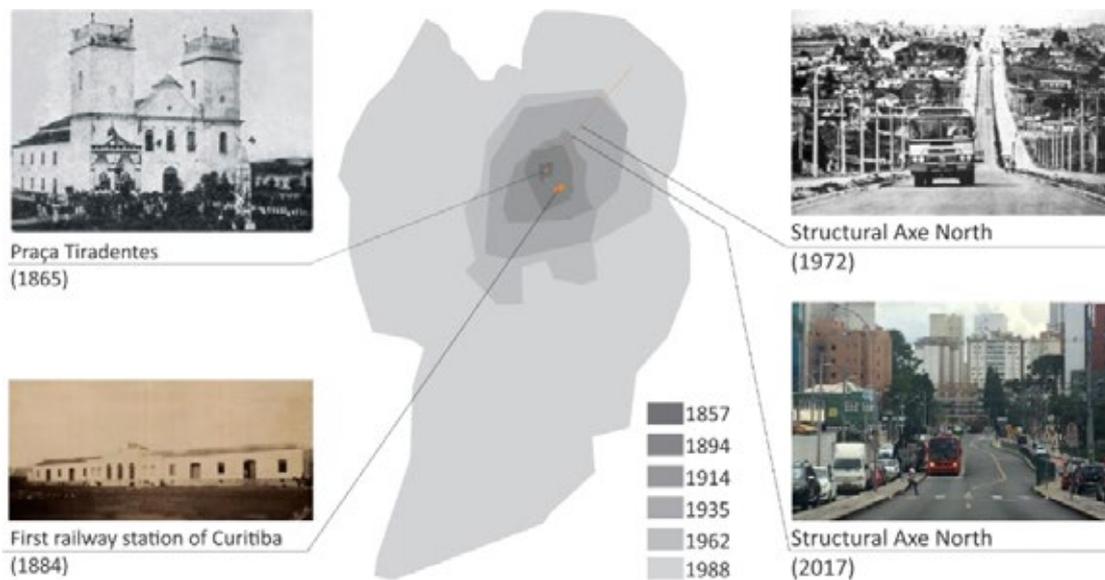


Figure 9 - The evolution of the urban area of Curitiba.

Font: Diagram: Authors. Pictures from 1865 / 1884, Without author, filed in Casa da Memória. Picture from 1972 found at <http://curitibaantigamente.com/> (accessed 20/01/2017). Picture from 2017: Authors.

Taking these specificities into account, and in order to analyse only the syntactic characteristics of the city of Curitiba, we aim at comparing the core of global and local integrations over time. For In order to reach that, we elaborated a table (Fig. 10), presenting a comparison between the amount of axial lines; size and shape of the integration core and the identification and position of the sub- centres (local integration) in each cited period.

Year	Space Syntax	Global Integration Core	Local Integration Core
1857	number of axial lines: 31		
	average integration value: 1.67		
1894	number of axial lines: 97		
	average integration value: 1.99		
1914	number of axial lines: 205		
	average integration value: 1.89		
1935	number of axial lines: 722		
	average integration value: 0.65		
1962	number of axial lines: 1,254		
	average integration value: 1.16		
1988	number of axial lines: 11,509		
	average integration value: 0.82		

Figure 10 - The comparison of size and shape of the Global and Local Integration Core of Curitiba – 1857; 1894; 1914; 1935; 1962 e 1988.

Font: Authors.

When Comparing the transformation of the cores of global integration over time we can see some interesting transformations. In 1857, this nucleus is positioned around Praça Tiradentes, the ground zero of the city, but in 1894, it stretches towards the Railway Station, and later, the east-west axis is formed, leaving the nucleus of integration with the shape of a cross in 1914. In 1935, there is already a resumption of a greater urban centrality, but with an enlarged centre, unifying the historic centre and the Railway Station. It is Interesting to observe that the Agache's

proposal is based on this more centralized city configuration. However, in 1962, shortly before the SERETE-Wilhelm Plan, the city was once again with the cross-shaped integration core. In 1988, the nucleus of integration continues in a cross format, but a breakdown in this format is already perceived, beginning to dissolve, or in another way of looking at it, returning to a greater concentration, as occurred in 1857 and 1935.

The centrality does not have very a clear limit. As time goes by, the centrality changes place, size and form, sometimes expanding or sometimes retracting. In Curitiba, the core of local integration presents such behaviour, with more grouped lines only in the 1857 map. After this date, the tendency to become a cross with balanced arms can be clearly seen in the 1894 to 1962 maps. However, in 1988 there is already a disarticulation of this form, with the formation of displaced sub-centres in the cross organization.

In the comparison between the global and local integration cores of each epoch it may be perceived a certain similarity in almost all the periods. But, it is interesting to note that in 1894 there is a greater differentiation in relation to both integrations, because, the nucleus of local integration tends to structure a sub- centre to the east, which ends up consolidating and becoming linked to the global integration core of the 1914 map. This situation also occurs with the local integration core of 1935, differently from the global integration of the same date, but similarly to the later global integration core, of 1962. In both cases it seems that the core of local integration ends up being the harbinger of what would happen in the city globally.

5. FINAL CONSIDERATIONS

The use of spatial syntax to analyse the urban expansion of Curitiba allows the interpretation of other dimensions of space, that is, the hierarchy of the paths from the potential of flows, which surpasses the information found in conventional mapping. The six axial maps resulting from the linear representations of the historical maps of Curitiba allowed the visualization of the accessibility arrangements and its articulations.

When observing the sequences of global integration maps over time, it is possible to record some important findings for the reading of the urban historiography of Curitiba:

- The growth of the urban network between the periods of 1962 to 1988 was about ten times, much higher than the average of previous years, when the city increased from two to three times the existing network;
- The most connected lines of the system, since the end of the nineteenth century, tend to the densification in the east-west and south axes, losing this relation only for a short time, represented by the map of 1935, in which the densification is more compact in the surroundings of the centre– railway station;
- The northern region is little connected to the city, a situation that becomes clear when we observe the nucleus of global integration of 1962, with the north axis more elongated and connected with the central area;
- Despite the growth trend of Curitiba to the south, only one route in this direction remained in the integrating nucleus of the city in all periods: The Marechal Floriano Peixoto Avenue (Fig. 07);
- The implantation of the railway station in 1885 (Fig. 09) changes the positioning of the integrating nucleus, initiating a growth towards the south of the capital. As a result of that, Ernesto Guaita's Plan to densify the city in a checkered grid based on the north-south and east-west axes, starting from the Railway Station, seems to be consolidated in the 1935 map, the last one in which the integrating nucleus appears denser;
- Some roads that appear only once in the integrator core had the potential to become new connection axes, but were ignored.

- The structure in Axes proposed by the SERETE-Wilhelm Plan in 1965 already existed if we analyze the core of global integration of the map of 1962. In this sense, it should be noted that its proposition followed a trend that was already implanted in the urban scenario. Such proposal, in 1988, already begins to demonstrate the loss of rigidity of these axes as organizers of the urban growth with the emergence of sub-centres that seem to be independent of the macro axes of city development.

If we look at the grid of the Curitiba city of 1988, very close to the present, we have identified that the most important decision for its structuring was the construction of the railway station in 1885. With the intention of developing the southern portion of the urban nucleus, the consequence, besides the initial objective, was the creation of the main development axes in the east-west direction. In addition, by the dimension of its occupation in the block, it also served as a driver of the north-south axis.

This linear organization of the city was lost only in one moment, in the map of 1935. By reading this condition, Agache proposed an intervention by radially strengthening the urban centre and the densifying towards its edges. Its plan, not realized in its essence, could have modified the urban lines of Curitiba to the present day. That is, we would possibly have another predominant urban structure.

The urban reading carried out by the SERETE-Wilhelm Plan, in 1965, resumed the linear situation of the railroad and strengthened it. This occurred with the consolidation of the north-south and east-west axes through urban transport, and of planning decisions that proposed verticalization, and population densification, along its borders. This situation has been increasingly solidified by IPPUC interventions from the 1970s to the 1990s, with the implementation of the "ligeirinho" (bus system faster than a normal bus line due its few stops) and, later, biarticulated buses and tube stations (simulation of a subway station on street level). Nowadays, due to the dimensions of the urban grid, the growth in axes has already lost its force in points farthest from the central area.

The methodology adopted proved to be adequate for the explanation of the theme and the available data, since, it was able to include, both in quantitative indexes and graphically, the particularities and permanencies of the evolution of the Curitiba urban network. This study, therefore, strengthens recurrent space-shape research, but will also contribute to the exercise of new questions. In addition, a number of issues can still be addressed in relation to the comparison between the planners' intentions and the resulting city few years later.

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