SPACE SYNTAX, LANDSCAPE URBANISM AND THE PERI-URBAN CONDITION:

The case of Bologna and Modena in Italy

Olimpia Cermasi University College London e-mail : olimpiacermasi@gmail.com

> Sophia Psarra University College London e-mail : s.psarra@ucl.ac.uk

Abstract

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Most accounts of the peri-urban landscape and the ways in which cities grow in their periphery tend to put this landscape aside as an anonymous or chaotic pattern of urban settlement. They are in effect influenced by old models of urbanization and perception that consider this landscape as the area of interface between the rural countryside and the city. However, certain patterns of human settlement show that peri-urban areas consist of a socially, economically and morphologically heterogeneous landscape necessitating a focused analysis. This need is further reinforced by contemporary design models that support new landscape-urban interventions (Landscape Urbanism) based on infrastructural networks, defining phases in time rather than defined forms, and considering the landscape as a tool for growth patterns under conditions of uncertainty (Frampton 1983, Marcel Smets, 2002, Allen 2010). Significant as these approaches are, any successful intervention raises the need to understand them in the light of the spatial morphology of a city and its peri-urban condition.

This paper looks at the patterns of urban growth in the Italian cities of Bologna and Modena, together with their peri-urban areas and their relationship with socio-economic activities. The first part provides a theoretical insight on the contemporary city and its peri urban conditions. Compared with the review of historic maps and existing literature, the analysis of Bologna and Modena in their regional context using Space Syntax demonstrate that the two cities developed distinct peri-urban conditions, as the layout of the street network expanded together and conjointly with different economic activities and industrial expansion. The necessity to make previsions on the patterns of growth of cities in their peripheries, requires a rigorous understanding of these evolutionary processes and the redefinition of terms like suburban, sprawl, polycentric, in order to avoid superficial denominations. The last part of the paper offers a comparison of Space Syntax theory and Landscape Urbanism, starting from their shared vision of urban settlements as dynamic processes of continuous evolution, as a way to provide a synthesis of theory, analysis and design practice as a methodological approach to the evolutionary aspect of cities, settlements forms and their growth patterns.

Keywords: peri-urban areas, urban growth, sprawl, Landscape Urbanism

Theme: Urban Space and Social, Economic and Cultural Phenomena

PERI-URBAN

New identities

The contemporary conditions of middle sized Italian cities like Bologna and Modena necessitate new concepts and new methods of analysis- as the way in which they have been developing in the recent years is not only a form of urban growth, but also a "change of state"¹. In fact, as Pietro Guidicini argued in 2002, the new forms of urbanity derived from the industrial growth in Emilia Romagna have resulted in alternative, territorial "new identities". As a consequence, traditional concepts and distinctions between 'urban/rural', 'center/periphery have to be revised, as they are in effect influenced by old models of urbanization and perception that consider this landscape as the area of interface between the rural countryside and the city.

Graham Shane traces the evolution of cities from the traditional, Eurocentric definition either as dense settlements distinct from the countryside or as broken beyond their former borders due to the industrial revolution, to a third conceptual and normative model. In "Recombinant Urbanism", Shane analyzes this particular "organic" city form, alongside the Ecological City, and the catalogue of heterogeneous urban systems proposed by Kevin Lynch in "Good City Form". Providing tools for the discussion of the new, post-industrial urban situation, Lynch moved beyond Frank Lloyd Wright and Broadacre City- the agrarian-industrial model of a city reclaiming vast landscapes- and defined what later critics named the "reverse city" (Viganò, 2001) and the "net city" (Oswald, 1999) among others.

As opposed to the Modernists that condemned both the sprawling caused by the industrial revolution and the pre-existing historical centres, Lynch and others sought to unveil the implicit logic of the contemporary city as a whole, by constructing a mental model of the urban network as

"a complex structure, with compressed nodes of activity and areas of widespread sprawl, that vary from low-rise development to the agricultural settlements that supports city life"²

Taking this into account, the kind of 'sprawl' envisioned by Wright for Broadacre City, with the landscape merging with the city into the countryside, was considered by Lynch as a positive evolution towards a new, 'organic' city model, carried on by several later critics. Andrea Branzi describes in "Agronica"³ the same sort of "expansive urbanization", defined as relational, flexible and potentially adaptable, in an agricultural metaphor, to different seasons and changing necessities of cities. In "Suburbanism and the Art of Memory"⁴, Sebastien Maròt provides a definition of "sub-urbanism" as a multilayered, complex and experimental reality, also in terms of techniques of territorial development.

In a way, some of the traditional assumptions, concerning the way contemporary cities grow in their peripheries as an 'anonymous' or 'chaotic' pattern of urban settlement are refuted by a new theoretical understanding and an objective observation of the peri-urban conditions.

¹ Francesco Indovina, La Città Diffusa (Venezia: DAEST, 1990)

² David Grahame Shane, Recombinant Urbanism, Conceptual Modeling in Architecture, Urban Design and City Theory, (Chichester, West Sussex: Wiley 2005) pag. 27

³ Charles Waldheim, The Landscape Urbanism reader (New York: Princeton Architectural press 2006) p.154

⁴ Sebastien Marot, *Sub-urbanism and the Art of Memory* (London: AA Publications, 2003)

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Fig 1a. Plan for the city of Bologna, Archivio Storico del Comune di Bologna While mantaining the original *forma urbis*, this *agrandissmenet* of post- risorgimental Bologna proposed a very diffused idea during that time: reproducing the existing pattern of urban fabric and leaving the hillsides as the only non-geometrical areas.





In order to detect the current decentralized and complex urban reality, Lynch focused on the large-scale systems, and by looking at their essential armatures of transportation networks, he

defined a series of new urban patterns- "stars", "nets", "constellations"⁵ among othersproviding a catalogue of recurrent morphologies of the contemporary cities. Following the same logic, we observe that the patterns of growth of urban settlements in the Emilia Romagna region show a tendency towards dispersion, while the evolutionary process of the new peri-urban territories was not homogeneous in all cities. As a matter of pragmatic concern, the varied components of Bologna and Modena's expanded network- the historic cores, new centers, dormitory areas, commercial nodes, industrial activities, and agricultural fieldsacquired rather different configurations and patterns of development over time, especially considering that the two cities lies on confining territories. As suggested by Lynch, a further comprehension of this phenomenon would require an accurate observation of the large-scale system and of the transportation infrastructure network.

Landscape Urbanism, as a design theory and method, seems to have inherited the idea of the city as a networked, large-scale system, while considering landscape, rather than architecture, as the proper medium to approach the evolutionary aspect of cities and the tool to project future patterns of inhabitation. The traditional Landscape design technique of dividing sites into phases of cultivation, is reinterpreted in Landscape Urbanism as a way of projecting on a site a possible pattern of development in different phases, organizing the layout of horizontal surfaces and the street network with landscape elements. This way, Landscape is assigned the ability to theorize and then envision the organization of a large urban site, providing flexible and open-ended solutions. In fact, when looking at the peri urban areas, territory of constant and progressive change, the way cities are unstable and constantly evolving organism⁶ defies the idea of a margin and of a design of fixed forms over a rigid master-plan scheme.

All this substantiate the need to explore these issues and the way cities grow in their peripheries using Space Syntax. In fact, projecting future patterns of growth of cities in their margins requires a rigorous analytical methodology that addresses their existing conditions, their evolutionary processes and the way they shape the spatial configuration at a broad scale.⁷ This work will be offering the use of Space Syntax as a rigorous way to look at cities as "evolutionary networked systems", and will contribute to an objective understanding of the spatial morphologies of cities and their peri-urban areas. By looking into the patterns of growth of two adjacent cities, Bologna and Modena, we analyze how they have developed in the most recent years in relation to their economic activities and social patterns. The analysis will provide quantitative expressions of terms such as suburbanization, decentralization, sprawl, polycentric, forming accurate definition of these concepts describing complex urban conditions.

As previously explained, the structural complexities of contemporary urban conditions defies a description based upon simplified conceptions of orderly hierarchies, separation of parts from wholes, and the opposition of rural and urban landscape. Space Syntax provides an "internally derived description that relies in minimum part on the use of language" (Hillier, 2009) and looks at the macro-scale system, considering cities as "orderly complexities", where the physical form is reproducing its underlying social and economic functional factors.⁸ As this fundamental

⁵ David Grahame Shane, Recombinant Urbanism, Conceptual Modeling in Architecture, Urban Design and City Theory, (Chichester, West Sussex: Wiley 2005)

⁶ "The physical and spatial structure of cities appears, for the most part, to be rather disorderly outcome of a long history of small-scale, incremental changes, which accumulate over time to produce patterns with neither geometrical nor functional simplicity" Bill Hillier, *Space is the Machine. A configurational theory of architecture* (Cambridge University press, 1996)

⁷ "A deeper analysis of the existing patterns, other that providing categories of heterogeneous settlement forms, allows us to envision and project future scenarios of growth. In fact, a precise understanding of the structural complexity of an urban system is the first step for making decisions about physical and spatial interventions" ibid.

⁸ "The physical form of an urban system is developed in conjunction to its functional economic, social, cultural and environmental patterns" Bill Hillier, "Spatial Sustainability in Cities. Organic Patterns and Sustainable Forms" (paper presented at the 7th International Space Syntax Symposium, Stockholm: KTH, 2009)

relation between form and function passes through the way cities organize space into configuration⁹, and the main correlate to spatial configuration is movement, the observation of the transportation infrastructural network reveals both the morphological structure of cities, and its implicit logic in relation with economic patterns and production activities.

Through the review of existing literature, the comparison with historical maps, and the analysis with GIS and Depthmap, the paper looks at Bologna and Modena in their macro-scale system, the Emilia Romagna region. The reason for choosing this particular case of study is that the two cities, even occupying confining territories, with the same geographical extension, developed into very different patterns of growth in their peripheries. For this reason, they are worth exploring the correlation between the spatial structure and the economic and social patterns, which determines the different configurational properties observed in their peri-urban areas. This way, the paper contributes to a better definition of urban and suburban issues, not as morphological categories *per se*, but in relation to all other layers of activities that constitute a city.

BOLOGNA AND MODENA

different peri-urban models

During the 60's Bologna experienced an unplanned growth, extending its influence on a wider territory, and developing into a new complex structure, with a well defined underlying order. The sociological and demographic aspects of the evolution of Bologna into a "metropolitan city"¹⁰ are widely discussed in previous literature.¹¹ What requires an accurate description are the physical transformations of the city and of its system of relations. This study shows that the evolutionary process of Bologna is other than the 'chaotic' pattern of urban settlement, or the 'anonymous' fabric, or city 'sprawl' in the countryside, as it has been described in previous studies.¹² On the other hand, Modena, together with Parma and Reggio Emilia, belongs to a "territorial city" that occupies the north-west of Emilia Romagna, and is characterized by the presence of massive industrial districts, and by a an extensive use of the territory. We will argue that the spatial configuration of the city and its surroundings follows a very different pattern from Bologna; but as well as in Bologna, it seems to have originated from the historical street network and have been mainly influenced by the specific economic activities and consequently by the social patterns derived.

⁹ To be more precise, "this relationship between activities and space is formed by the way different activities make different demands on movement and co-presence" Bill Hillier, Laura Vaughan. "The city as one thing" Progress in Planning, 67 (3) 205-230 (2007)

¹⁰ Patrizia Gabellini, Andrea di Giovanni, Caterina Gfeller, Marco Mareschi, Immagini del Cambiamento in Emilia Romagna (Bologna: Editrice Compèositori, 2012)

¹¹ Pietro Guidicini, Luoghi metropolitani: spazi di socialità nel peri-urbano per un nuovo welfare (Milano: Franco Angeli, 2000)

¹² Fausto Anderlini, Sprawl suburbano e dinamica sociale, Bologna e altre metropoli (Bologna: CLUEB, 2003)

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Fig. 2b. Settlement density pattern and peri urban towns of Bologna



Fig 3a. Choice Network at Radius 10000



Fig 3b. Choice Network at Radius 20000

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The space syntax segment analysis using Depthmap shows how the two cities relate to the main regional structure and, at the same time, leads us to two different definitions of peri-urban settlements. Looking into the regional macro-scale system, the choice network at radius 10000 at present day (fig.3a) picks up the main centres and main longitudinal infrastructural road of the region, the via Emilia, which passes through the provinces of Piacenza, Parma, Reggio Emilia, Modena, Bologna and Imola and ties them together in a linear system that crosses the region from east to west.

The highways show no significant inter-connecting role in the main layout and have low values of choice compared to the via Emilia, which proves to have remained the main armature of the regional spatial configuration. The large scale choice network at radius 20000 (fig.3b) shows the main spatial configuration of the system, picking up both the via Emilia and the North-South connections. When zooming in on the area in examination, we can observe that the choice network at radius 20000 picks up Bologna and Modena as two different road network structures, telling us something about the spatial differences between the two cities spatially. The first one, Bologna, consists of a radial pattern, connecting a main centre to series of smaller towns set into the countryside and mainly residential. The second, Modena, shows a very interconnected pattern, diffused over the region of Modena and linking many urbanized areas together across the landscape. The different configurational networks do not fit into any traditional descriptions, especially those opposing the "city" to the "countryside", and requires a further exploration.

Focusing our attention on **Bologna**, when comparing the IGM historical map dated 1850 (**fig.2a**) to the contemporary choice network at radius 20000 (**fig.3b**), it is evident that the growth of the Bologna in its peripheries functioned according to its original transportation infrastructural network, which at a macro-scale formed a particular 'star' shaped configuration. Choice network at radius 20000 picks up the historical, main transportation infrastructural network, and confirms that the city developed as a 'compact 'node, and a 'radio-centric', historical foreground network of routes that strongly ties the smaller towns of the peri-urban area to the city centre. As described in previous studies, the historical radial roads became the main streets of the new, expanded network that incorporated the small towns of the province into a broader system. Although Bologna has been affected by progressive "de-centralization" of the residential areas, the choice network shows that these maintain strong syntactic relations to the old urban core.

The foreground network, in terms of how the network of the Bologna and Modena is connected up at a global scale, informs us on the relation with the different socioeconomic and production patterns on the two cities, proving that "space is not a neutral container, but an integral component" of the development of cities¹³. In fact, when capturing the spatial correlates of different social, cultural and economic forces, taking place in two confining cities within the same region, this study will show that the urban fabric possesses the potential of producing very different outcomes when acting conjointly with social and economic activities. Focusing on Bologna, the radial relationship of the city with the surrounding towns confirms a socioeconomic pattern based on the relationship between Bologna and these local centres based on an urban core that functions as the centre of tertiary economic activity and residential towns tied up to this core. The spatial configuration properties at a macro-scale consolidated the city as a strategic pole of the infrastructural network, of education, commercial activities and tertiary sector's activities at a national scale, in a thirty-years time evolutionary process (Gabellini, 2012). At the same time, the emerging socioeconomic patterns continued to

¹³ Sophia Psarra, Conrad Kickert, "Detroit, the fall of the public realm: the street network and its social and economic dimensions from 1796 to the present" (paper presented at the 8 International Space Syntax Symposium, Santiago de Chile: PUC, 2012)

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reinforce, in a "multiplier effect"¹⁴ the new configurational properties at a urban scale. To break it more clearly into phases, the first stage of the development of Bologna in its peri-urban areas, consisted in the development of the first belt of peripheries during the 1960's, designed as macro areas of industrial activity and social housing quarters and organized with a rigid zoning. These areas developed contiguously to the city center, right outside of its historical outer ring, progressively occupying the areas between the radial roads connecting to the city centre.



Fig. 4c. Landuse Pattern dated 2003

The integration network at radius 20000 shows that the highway, the radial roads, and the ring infrastructure connecting to the city centre are the most integrated lines whereas the areas in between, especially on the west side, have a segregated pattern at a local scale, with no

¹⁴ Bill Hillier, "Spatial Sustainability in Cities. Organic Patterns and Sustainable Forms" (paper presented at the 7th International Space Syntax Symposium, Stockholm: KTH, 2009)

emerging local centres. When compared to the global integration network, at radius 10000, they have higher values than locally, but still lower than the radial roads connecting to the city centre. The land use map dated 1976 **(fig. 4b)** shows that, during the following years, the industries and agricultural production activities followed a generic pattern of decentralization, occupying the areas around the small towns of the peri-urban territory of Bologna, preferably those strategically located in proximity to the city center.



Fig 5. Integration Network at Radius 10000

Sociological studies describes this as a mechanism of "filtering up" of production activities (Guidicini, 2002), which allowed Bologna to concentrate in the city center the most prestigious tertiary or directional activities. Demographic datas show that the expansion of the tertiary sector determined a massive rise of the real estate value of the city center. This influenced, as a consequence, a voluntary 'migration' of the new middle class working in Bologna to the peri-urban towns around the city, which continued for almost thirty years through different evolutionary phases.

From 1980 to 1993, the growth was recorded mainly at the most important, historically consolidated centers of the peri urban areas, such as Casalecchio, San Lazzaro, Castel Maggiore, following the radial spatial pattern derived from the original layout of the infrastructural armature, as previously described. From 1993 to 2000, the growth of the peri urban towns took place in a more homogeneous way: all centres registered an increase of the number of inhabitants. regardless to their geographical location and their dimensional standards. The smaller centres grew in a less compact way compared to the bigger ones, but in general they maintained the well defined physiognomy of 'clusters', distinct and separated one from an the other. This evolutionary pattern of the towns of the peri-urban in Bologna not only finds its origins in the historical morphological character of small and compact centers, but also was influenced by the emerging social identities that generated new modes of territorial belonging.

The Integration analysis confirms the previous studies and shows, for Bologna and Modena, different pattern of inhabitation. In the case of Bologna, the spatial structure reflects the hierarchical relationships of the main core with the peri-urban towns, mainly middle-class

residential clusters. As observed, the Integration network at radius 10000 (fig.5) picks up the peri-urban cities of Bologna and the radial roads connecting to the main core. This shows how those towns feature primarily as to- movement areas. In fact, as explained in "Spatial Sustainability in Cities", the choice network, representing through-movement, captures primarily economic activity whereas the integration network, representing to-movement in the system, captures the residential areas as well (Hillier, 2009).

This confirms that the peri-urban towns around Bologna don't function as autonomous centers, but more as "dormitory towns" for a population of commuters to the city center for work. Choice network at radius 20000 (fig.3b) confirms that the foreground network of radial roads functions as a strong connector for each town of the peri urban areas to the city centre. The network, as observed, picks up very few later roads, showing the peri-urban towns are not interconnected but mainly dependent on the main core of the city centre. The background network shows a less dense and tight street pattern at the South side because of the hill-side conditions as well.

Previous sociological studies confirms the capacity of this new 'polarized' spatial form to reorganize the new, emerging 'networked' society- as a catalyst for the tendency towards new suburban lifestyle¹⁵. The historical centres of Castel San Pietro, Anzola, Funo di Argelato among others, while being set into great ambient conditions- hill-side or rural areas- are considerably accessible due to the proximity to the railroad (fig.2b) and being located on the historic network of radial roads connecting to the city center. These conditions allowed an everyday commuting for the middle class working in the city centre, avoiding the traffic congestion and lower environmental qualities of the more compact, first belt of peripheries developed together with the industrial activities in the 1960's.

As shown in the land use maps (fig.4), few main services and commercial areas were distributed on strategic locations, along the main roads connecting the peri-urban territory to the city centre, with the purpose of reinforcing the dynamic relationship between the two parts of the system. On the other hand, confirming how existing studies defined Bologna as a "metropolitan city", the previously analyzed integration network proves that the peri urban towns don't function independently from the city centre. As opposed to this, the city of Bologna performs as the strongest and only 'attractor'. Demographic data show that Bologna has now 170.000 people commuting for work on a daily basis from the sixty small towns around Bologna to the city centre. The population of the peri urban areas of Bologna continues to grow steadily, with the whole system maintaining its radio centric spatial layout. At the same time, some of the industrial activities originated in the peripheries of the 1960's are being dismantled.

The radiocentric form of the foreground network in Bologna reflects the economic activity of the city as a national tertiary pole, as opposed to the area of **Modena**, that shows a very different model of spatial accessibility when observed within the whole system of Modena, Parma and Reggio Emilia. The choice network at radius 20000 (**fig.3b**) picks up, when observed within its large-scale system, a sort of "deformed grid" pattern (Hillier, 1999), which correlates to the extensive use of the territory due to the matured industrial activity. The layout of production activities (**fig.6**) shows an extensive use of the territory; the wide network of commercial and production interchanges doesn't follow a logic of proximity, as the economic impact of the industrial activities is international.

The growth of the towns around Modena took place over an historically polycentric territory: as in the historical maps dated 1874 (fig.7a) Modena and its surroundings originally formed a land

¹⁵ Manuel Castells, The Informational Cities: Economic Restructuring and Urban Development, (Oxford:Blackwell Editions, 1989)

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of multiple dukedoms, principalities and counties. On the other hand, the comparison of the land use maps dated 1954 and 1970, shows that the recent dispersed settlement model was fostered by the more recent industrial expansion. The industrial development in the Modena region was encouraged by the administrative government in Modena as a way to overcome the massive unemployment rate of the years of the "reconstruction" after 1945.



Fig 6. Choice Network at Radius 20000 and layout of production activities in Bologna and Modena

The analysis refutes the assumption that all the main industrial settlements around Modena are disconnected from the city centre, and tied to the main infrastructural network of the highways because of the demands of the industrial activities and transport of goods. In fact, the highways don't show high values of choice at the global scale. On the other hand, the choice network at radius 20000 (fig.3b), while picking up the "zone of influence" of the city of Modena, shows high values on the radial roads connecting the city centre to the closest peri urban towns of Formigine, Sassuolo, Maranello on the South side, Rubiera on the West side and Nonantola on the East side. The two main roads connecting the industrial towns of Sassuolo and Maranello, producing ceramics and sports cars (Ferrari, Lamborghini, and Maserati) respectively, have high values of choice at radius 20000, showing that the two towns have a strong relation to the city centre. Moreover, the lateral road linking the two towns has also high values, confirming the previous interpretation of the large-scale system of Modena as an 'interconnected pattern'.

In the same way, the choice network picks up as well the road connecting the historical towns of Formigine and Nonantola to Modena: those smaller clusters, mainly residential, show a strong syntactic relation to the city centre due to its proximity. A different pattern is observable in Carpi, on the North-west side, mainly renowned for its massive textile industries development. The main road connecting Modena to Carpi has lower values of choice as global scale, compared to those connecting to Sassuolo and Maranello. This town in fact seems to function as an autonomous centre, with its own network of radial roads, connecting to the outer areas and to the surrounding smaller centres.



As opposed to Bologna, integration at radius 10000 (fig.5) represents two patterns of density, one related to Modena and the other to the industrial towns of Sassuolo and Maranello, picking up two main roads that connect them with the city centre showing high values of integration. The integration patterns we observe account for the accessibility of the street segments as destinations, and reflect the to- movement structure of the city (Hillier, Vaughan, 2007). As

opposed to Bologna, when zooming out and looking at the macro-scale system, we see that higher values of integration at a global radius are distributed across the whole area of Modena. More precisely, the analysis of Modena with Space Syntax shows a process of pervasive centrality (Hillier 2009), spreading over the territory and derived from the massive industrial growth as well as the development of different production activities.

We can look at the town of Sassuolo (fig. 8) to verify how the industrial activities after the 1950's influenced the development of particular spatial patterns. At a global scale, the integration network at radius 10000 picks up a dense, geometric and rather homogeneous pattern, which tells the history of Sassuolo as an industrial 'new town'. In fact, the town didn't experience an incremental and organic evolution. It was developed in a very short time instead, after 1950, by the city of Modena, due to the increasing demands of the industrial production of ceramics in the area. Previous studies confirm that the population increased four times its size in less than ten years, and continued growing in a uniform way, attracting immigrants from the nearby areas and, more recently, from North African and Eastern European countries (Gabellini, 2012).



Fig 8. Integration Network at Radius 10000 in the province of Modena

In fact, as opposed to Bologna where the middle class are moving out of the city centre, the immigration population in Modena involves mainly workers of the different industries which have been occupying the areas close-by since 1960 until very recently. As a consequence, the city centre in Modena, as opposed to Bologna, doesn't represent a work destination for the inhabitants of the smaller towns of the Province. Most of the peri urban towns around Modena, as described previously, seems to work autonomously as socioeconomic centres. This can be confirmed by looking at the integration pattern (fig.8). When looking at Sassuolo and Maranello, we observed a very integrated pattern at a global scale, which is traceable as well at the local scale. In fact, the integration network at radius 1500 (fig.8), picks up the local centres in correspondence to the most integrated roads connecting the towns to Modena, showing that the system has the same logic both locally and globally.

This study showed that both Bologna and Modena seems to be successful in shaping their growth in a way that benefits their quite different economic scenarios. On the one hand, Bologna, a tertiary town with a shrinking industrial activity and the expansion of important services, such as the international fairs, the health care system, the university, developed as a 'city' with a series of residential towns, linked to it by a series of radial roads, avoiding congestion and allowing an everyday commuting to work. On the other hand, Modena, internationally renowned for its industrial production, grew over an expanded and interconnected territory of towns-industrial centres. The analysis of the street network using space syntax demonstrated not only that heterogeneous spatial morphologies are the "product of interaction between environmental, economic and social factors" (Hillier, 2009), but also that there are no universal rules on how the cities grow in their peripheries. It seems that the successful ones, as the two cities in exam, instead of having similar morphological patterns, show a coherent relation between all the layers examined, such as the economics, social, land use, movement patterns and the spatial structure of a city at the macro-scale.¹⁶

LANDSCAPE URBANISM AND SPACE SYNTAX

cities as dynamic processes of continuous evolutions

Returning to the theoretical definitions of these spatial social and economic phenomena discussed at the beginning of the paper, it is worth exploring affinities between design theories such as Landscape Urbanism and the analytical theory of space syntax. Although fundamentally different, these two theories share an approach to urban settlements as dynamic processes of continuous evolution, and most importantly both approach cities as movement networks. Landscape Urbanism is a design theory derived from different design approaches- architecture, landscape architecture, urban design- and evolving towards a new, common understanding of cities as complex, multilayered realities which defies rigid mechanism of intervention. This theory approaches the contemporary city as landscape and considers landscape as the perfect medium to interpret its complex reality. Landscape Urbanism proposes to shift scales, to locate urban fabric in a macro-scale context, and to define the relationships between dynamic processes and the emergence of urban form. Landscape is taken as a conceptual tool, capable of theorizing sites, territories, ecosystems, and most importantly networks and infrastructures. (Corner, 2006). Most importantly, it is capable of organizing large urban fields as patterns of development, through phases in time, with an understanding of cities as being about processes of growth.

Space syntax also sees cities as a "rather disorderly outcome of a long history of small scale, incremental changes" (Hillier, 1984). Both approaches therefore articulate how different flows and forces shape urban form. Commonalities emerge between the two theories along the belief that cities experience self-organized processes of growth depending on those forces, and have

¹⁶ "As spatial barriers diminish so we become much more sensitized to what the world's spaces contain. Flexible accumulation typically exploits a wide range of seemingly contingent geographical circumstances, and reconstitutes them as structured internal elements of its own encompassing logic. For example, geographical differentiations in the mode and strengths of labour control together with variations in the quality as well as the quantity of labour power assume a much greater significance in corporate locational strategies. New industrial ensembles arise, sometimes out of almost nothing (as the various silicon valley and glens) but more often on the basis of some pre-existing mix of skills and resources. The 'Third Italy' (Emilia- Romagna) builds upon a peculiar mix of co-operative entrepreneurialism, artisan labour, and local communist administrations anxious to generate employment, and inserts its clothing products with incredible success into a highly competitive world economy" David Harvey, *The conditions of Postmodernity. An enquiry into the origins of cultural change* (Blackwell Publisher, 1990)

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an internal implicit logic¹⁷. Landscape Urbanism pursues a "more organic, fluid urbanism" and provides a tool through which interpreting the contemporary urban reality and "projecting alternative urban futures"¹⁸. Space syntax also understands urban phenomena based on growth patterns and sees cities and urban settlements as evolutionary processes.

Taking into account the evolutionary aspect of cities and settlements forms, Landscape Urbanism and Space Syntax theories interprets the organization of industrial society and its use of resources as constituting an urban landscape far beyond the scale of the traditionally delimited European city (Shane, 2005). Different conditions of the city into its peri-urban territory involves built, urban areas set into a majority of undeveloped, rural open spaces. The analysis of Bologna and Modena using space syntax shows that although network properties can explain patterns of growth and socioeconomic activity, we need models that can capture density patterns as well as the relationship between built and undeveloped areas, as a way to understand the diversity of urban settlements and forms.

Peri urban areas of contemporary cities prove to be heterogeneous and dynamic territories, and as suggested by Sebastien Marot, represent an opportunity to propose alternatives to the traditional and orthodox urban planning approach (Marot, 2003). In the condition of 'uncertainty' (Smets, 2002) as the impossibility to picture the future growth of the contemporary city and the incapacity to shape its definitive form, Landscape Urbanism proposes itself as a savior to contemporary urban design¹⁹. When projecting patterns of growth of contemporary cities in their peripheries, urban design can "utilize" landscape as a "pre-ordering" infrastructure (Frampton, 1983) of a site, using landscape elements to design a pattern of future development.²⁰

To sum up, contemporary practice needs to look for a design tool that is flexible enough to address the uncertainty regarding the future necessities of cities, provides open-ended solutions, and at the same time allows strategical thinking about the growth patterns of cities in their peripheries. In envisioning patterns of growth, we need to integrate analysis and understanding of landscape in terms of geomorphology, movement, economical and social infrastructure. Landscape Urbanism and space syntax are different approaches, one analytical the other design based, and both see cities as evolutionary phenomena. On the other hand, this analysis using space syntax has shown that there are different models of growth and of the relationship of urban settlements to the wider territory. Therefore, we cannot assume a single model, as Landscape Urbanism, based on a dispersed pattern of in habitation.

Most importantly, the operation of establishing "an infrastructural backdrop for future development" (Shannon, 2006) of a site, requires a rigorous way to to look at street networks, in order to come up with a projected pattern of growth that is not arbitrary. As explained, space syntax provides a methodology of analysis of different urban conditions, proving to be a rigorous tool for linking specific features of the network infrastructures to different economic and social patterns. Having reached such a deep understanding of the way different grid structures are shaped by the demands of this social and economic forces on movement, we can

¹⁷ "Apparently incoherent or complex conditions are shown to be highly structured entities with geometrical and spatial order". James Corner, "Terra Fluxus", in Charles Waldheim (editor), *The Landscape Urbanism Reader* (Princeton Architectural Press, New York, 2006)

¹⁸ Ibid

¹⁹ Kelly Shannon, "From Theory to Resistance. Landscape Urbanism in Europe", in Charles Waldheim (editor), *The Landscape Urbanism Reader* (Princeton Architectural Press, New York, 2006)

²⁰ In the Unimetal Park project by Dominique Perrault, landscape is assigned the ability to theorize and envision the organization of a large urban site, projecting with landscape elements- such as rows of plants and 'carpets of green'- the future possible spatial structure of the area and of its street network. This kind of operation of "pre-landscaping" -using landscape to "mark the territory with a texture"- functions as an intermediary stage of development, as the green fields plot size correspond to those of eventual building lots. Ibid.

use space syntax not only to test proposed design solutions, but also as a strategic tool for informed, multilayered design processes, considering the detailed micro and macro-structure of the street network as the most important player on environmental, economic and social sustainability.

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