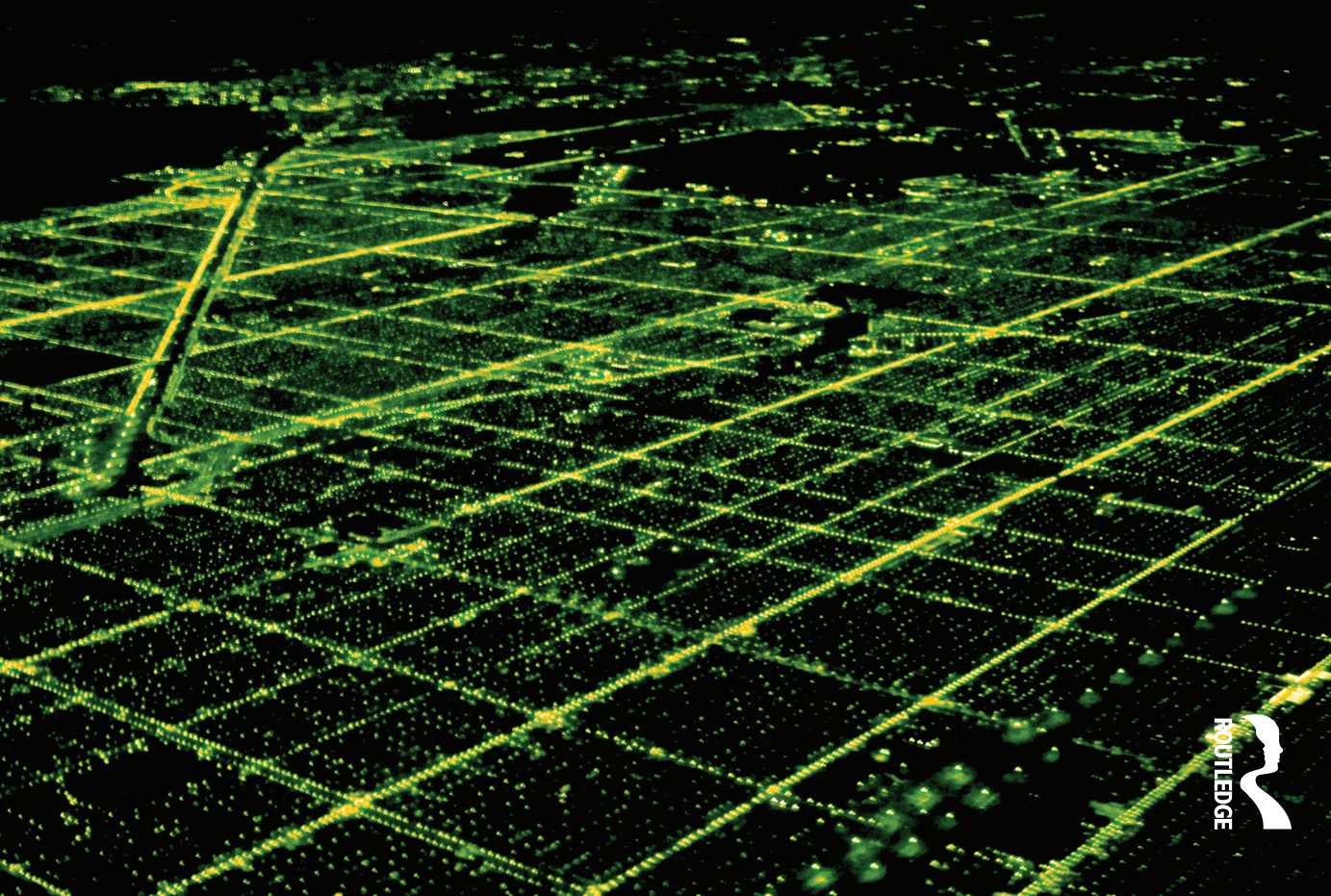


# THE SYNTAX OF CITY SPACE

## American Urban Grids

Mark David Major

Foreword by Ruth Conroy Dalton



Many people see American cities as a radical departure in the history of town planning because of their planned nature based on the geometrical division of the land. However, other cities of the world also began as planned towns with geometric layouts so American cities are not unique. Why did the regular grid come to so pervasively characterize American urbanism? Are American cities really so different?

*The Syntax of City Space: American Urban Grids* by Mark David Major with Foreword by Ruth Conroy Dalton (co-editor of *Take One Building*) answers these questions and much more by exploring the urban morphology of American cities. It argues American cities do represent a radical departure in the history of town planning while, simultaneously, still being subject to the same processes linking the street network and function found in other types of cities around the world. A historical preference for regularity in town planning had a profound influence on American urbanism, which endures to this day.



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# The Syntax of City Space

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American Urban Grids

Mark David Major

Foreword by Ruth Conroy Dalton

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For more information about the author, visit [www.outlaw-urbanist.com](http://www.outlaw-urbanist.com) or [www.markdmajor.com](http://www.markdmajor.com).

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*"Cities happen to be problems in organized complexity."  
Jane Jacobs, The Death and Life of Great American Cities*

*"Man walks in a straight line because he has a goal and knows where he is going;  
he has made up his mind to reach some particular place and he goes straight to it."  
Le Corbusier, The City of To-morrow*



## Foreword by Ruth Conroy Dalton

Never has there been a better time for a new book about the American city. We have only recently passed the point at which more people around the world live in cities than in the rural hinterlands. At the same time, we are being told that the city itself is on the cusp of a revolution via new technologies. Discussions of a New Urban Crisis, smart cities, responsive and resilient cities, technology-enabled cities, Big Data cities, or (fill in an appropriate new 'buzz word' here) cities abound. These are cities in which the citizen is ever more engaged, enabled, and, perhaps, even liberated via technology. This is a future in which citizens are able to instantly interact with other citizens via numerous electronic devices while the devices themselves communicate with yet more devices. This all occurs against the ever-present and technologically enabled background of the city which, in turn, tracks or senses its citizens to respond instantly to their every whim. This future vision and its brusque rate of change can feel bewildering – a leap into an unknown future. If you do not feel mildly terrified about this, then you might not have given it enough thought.

Nonetheless, isn't this what America has always been about; a brave leap into the unknown? *The Syntax of City Space: American Urban Grids* takes us on a journey right back to the origins of cities in America such as New Haven, Philadelphia, and Savannah. It is clear (especially once you have read the book) that this period in history was yet another in which America was undergoing a rate of rapid change and frenetic urbanization quite unlike anything else hitherto known in the world. Major demonstrates in this book that while the thrall of the new can entice, what lurks beneath are a few immutable spatial laws. And so, at this current time of techno-revolution, we can take reassurance from the main message of this book. While the onslaught of new technologies and their concomitant social issues can seem relentless, beneath the surface – rather like some large, betentacled behemoth of a sea creature lurking in the deep, still waters of urban planning – the constancy of space and spatial laws abide. The simple message of this book is that the American urban grid is both new and different yet, at the same time, possesses familiar underlying

mechanisms – namely, the social logic of space – which prevail. But this reassurance in the face of change is not the only purpose of the book. A far more prosaic purpose was to conduct a comprehensive survey of American cities using objective, rigorous, quantitative descriptions “of the thing itself” as Major so succinctly phrases it. Why? So we can better understand the American city in all of its myriad complexity. To achieve this, Major begins the book by reviewing the history of regular grid planning in the world. And so we arrive, perhaps a little belatedly in this foreword, at the American urban grid!

I have only had the pleasure of living in one American city, but what a city! Atlanta, Georgia. This is the city that still lays claim to the dubious accolade of having the longest average, daily automotive commute in the United States. When I first arrived in Atlanta, I remember taking a walk on foot (!) in order to try to find the nearest grocery store; a typical quest for any newly arrived citizen. Prior to my arrival, I had diligently identified on the map where I thought this store should be located and which, according to my naïve European perspective, should have been a mere 15-minute walk away, i.e. about a mile. My walk began in Downtown Atlanta adjacent to Woodruff Park, an area known as Five Points, the widely accepted geographic center of Atlanta. It felt suitably downtown-ish containing an impressive number of respectable, Southern banking-type buildings, hulking stolidly around Woodruff Park in an easy camaraderie. As I walked away from the center, it astonished me how suddenly the character of the neighborhood changed. As if by magic, I had crossed some imperceptible threshold, some invisible line, and I was clearly in the wrong neighborhood. In reality, this represented the difference between just one urban block and the next. And yet, in other terms, I had found myself to be an entire world away from where I had begun my journey. All I really knew, and what every instinct was telling me, was that I should probably not be walking through that particular neighborhood. In European cities, this simply does not happen. And yet, in the American gridded city, this is surely an experience that every reader of this book will be familiar with. So much for the supposed equivalency and democratization of space.

In Orwell’s dystopian satire, *Animal Farm*, he coined the now famous maxim, “All animals are equal, but some animals are more equal than others.” I believe that this can be cheekily paraphrased and applied to the American city, “All spaces/streets/blocks are equal, but some spaces/streets/blocks are more equal than others.” In this book, Major suggests that, “the typical view of American urban space... is intimately tied to the egalitarian nature of American self-identity.” And yet he then gleefully goes on to demonstrate the inherent spatial discrimination and lack of democracy in the American urban grid. If there is one ‘take home message’ in this book, it is the fact that space is not merely some passive background to urban life. It has agency and a tangible effect on the social life of the city-dweller and this is as true of American cities and the idealized urban grid as it is of anywhere else in the world.

I first met Mark David Major 22 years ago when he was the Course Director of the Masters course in Advanced Architectural Studies at University College London. ‘Advanced Architectural Studies’ was a deliberately vague and all-encompassing title for a Master’s course. For those in the know, it was nothing less than the essential training ground for anyone interested in space syntax; a family of theories, techniques, and methods for the quantitative analysis of spatial systems. There was something rather special and exhilarating about space syntax in London during this period of time. If this foreword seems to be focusing on the theme of times of transition, then this

period in London during the 1990s was certainly one of them. The reason is that space syntax was rapidly becoming mainstream. Common, household-named architects such as Norman Foster, Richard Rogers, and Zaha M. Hadid were utilizing space syntax analysis in design work. Space syntax was being employed as indisputable evidence in public hearings and planning appeals throughout the United Kingdom. It was no longer niche but in the process of evolving into the conventional and commonplace. Major was there at the very epicenter of this intellectual and professional explosion. Key to this development was the first Space Syntax Symposium, which was organized by Major and took place in 1997. I also happen to be one of the select few who attended this first symposium as well as one of the even more select few who attended the last one as well. It has now grown into a fully-fledged international conference, celebrating its 10th biennial occurrence in London in 2015. Over the years, Space Syntax Symposia have attracted a huge following with hundreds of papers submitted to each event from all around the world. I will repeat myself here: Major was there at the beginning of all of this. He was one of the first of the new/next/second generation – a blossoming generation – of space syntax researchers and practitioners standing on the shoulders of Bill Hillier, Julianne Hanson, and Alan Penn.

*The Syntax of City Space: American Urban Grids* is great for three reasons. First, and most seriously, because the book presents the most complete, systematic spatial analysis of a large database of both historic and contemporary American cities. Second, this book is sorely needed because American cities have been woefully underrepresented in the corpus of space syntax writings while, at the same time, American urban design professionals have been equally – and also woefully – uninformed about space syntax. I hope that this book will go some way in redressing this balance. Finally, this book is great because Major can actually write! This is not a comment often made about academic books. Major has a gift for rendering a topic that can be, on occasion, somewhat inscrutable into a text that is conversely easily accessible.

This is a scholarly yet gracious book: a hard balancing act to achieve. Major achieves this balance magnificently.

**Professor Ruth Conroy Dalton** is an architect, academic, and author.

She is an alumna of University College London, where she received her doctorate. As a licensed architect, Ruth has worked for Foster and Partners and Sheppard Robson Corgan Architects on projects in France, Spain, and England. She has taught at the Architectural Association and Bartlett School of Architecture and Planning in London and the Georgia Institute of Technology in Atlanta, Georgia. Ruth is the Professor of Building Usability and Visualization at Northumbria University and co-editor of *Take One Building: Interdisciplinary Research Perspectives of the Seattle Central Library*.



## Preface by Mark David Major

Space syntax can be daunting for the uninitiated. If it is any consolation, it is equally daunting for the most experienced and talented of space syntax practitioners or researchers, too. It is not because the ideas of space syntax are difficult. Quite the opposite; most are simple. The simplest being people tend to gather in a circle to interact and walk in a straight line to go somewhere.

In the late 1990s, a client was interviewing a distinguished architectural firm for an urban redevelopment project with an estimated cost of nearly \$1 billion. Space syntax consultants were members of their project team. The client asked the project leader, “Space syntax? Don’t they only tell you the obvious?” This person thoughtfully paused for a few moments before replying, “Yes, but it’s only obvious to us after they say it.” This exchange is telling. Space syntax challenges our assumptions about the built environment; some taught, learnt, and held for a long time, especially over the last century or so.

In some ways, space syntax has been a victim of its own success. Its premise proved so simple and powerful that it led to an explosion of new methodological ideas and theoretical possibilities for researching the built environment. Like any scientific research program, it takes time to conjecture, hypothesize, measure, observe, test, and refine its ideas, methods, and terminologies, and then disseminate to a larger audience. Along the way, researchers developed a proverbial cornucopia of measures for the space syntax toolkit. Over time, many proved valuable and some esoteric while others were tested and eventually discarded. It takes years, even decades, for this scientific process to work itself out. In the meantime, the sheer quantity of available information about space syntax has a tendency to overwhelm people. It leaves them unsure about how best to proceed in the absence of a ‘sink or swim’ dive into a literature growing at an almost exponential rate over the last four decades.

This is only the beginning.

Practitioners and researchers develop innovative ways to interrogate space syntax models for detecting ‘deep structures’ in spatial networks of the built environment. This is a matter of explaining technique, not necessarily measurement. A wide range of disciplines interested in some aspect of the built environment utilize space syntax. Because of this, space syntax people often have to tailor their explanations for the background of a particular audience, i.e. academic, professional, language, education, and so on. Sometimes, particular audiences possess quite different backgrounds and/or agendas, i.e. cost, profit, regulatory, style, method, academic ‘silos,’ professional ‘turf wars,’ and so on. Finally, space syntax practitioners and researchers are people, too. Some explain space syntax better than others. Others get ‘lost in the weeds’ and lose sight of the story they were trying to tell. It is human nature.

Given these circumstances, it is easy to feel overwhelmed whether you know a great deal about space syntax or nothing at all. Do not be discouraged. This book is a good place to start. It attempts to disseminate the basics of space syntax to a larger audience with a particular interest in American urbanism. In doing so, it runs the risk of lacking the terminological precision expected and/or demanded by some in the space syntax community. It is an acceptable risk given the widespread exportation of American design and planning principles around the world during the post-war period and the potential importance of space syntax for the future of our built environments and cities.

*Dr. Mark David Major, AICP, CNU-A*

# The Syntax of City Space

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American Urban Grids

Mark David Major



## INTRODUCTION

# The American Urban Object

*"The street is a spatial entity and not the residue between buildings."*

- Anonymous

Urban theorists often describe cities based on characteristics of their physical form. These descriptions are usually expressed in terms of a dichotomy where meaning emerges from contrasting cities as organic or regular, unplanned or planned, natural or artificial, generated or imposed, and so on (Gallion and Eisner, 1963; Alexander, 1965; Moholy-Nagy, 1968; Kostof, 1991; Batty and Longley, 1994). Kostof (1991) suggests this dichotomy is “the most persistent, and crudest, analysis of urban form” whereby the first stresses process over time in terms of “unplanned evolution” or “instinctive growth” and the second stresses the conscious act of design in a “centrally planned scheme” (43). Such descriptions have proven useful for a basic understanding of cities across different cultures, geographical regions, and time. The usefulness of descriptions such as ‘organic’ or ‘regular’ lies precisely in the fact that they are theory-loaded terms. They seemingly convey a lot of information in an easy-to-grasp manner. It can be said ‘seemingly’ because they are such theory-loaded terms that it can often lead to confusion, which makes their descriptive value sometimes “more a hindrance than an aid” (ibid). For example, ‘regular’ seems to be an explicit description of both the physical form and process that gave rise to that composition. However, the term ‘organic’ seems to only pertain to process. According to Batty and Longley (1994), organic cities “grow naturally from a myriad of individual decisions at a much smaller scale than those which lead to planned growth. Planned cities or their parts are usually more monumental, more focused, and more regular, reflecting the will of one upon many, or, at best, reflecting the will of the majority through their elected representatives” (8).

The term ‘deformed’ is sometimes used to describe the physical form of organic cities but, more often than not, it is tacitly understood as a given about such cities. Describing the physical form of cities as ‘deformed’ or ‘regular’ is also theory-loaded because it implicitly characterizes them in geometrical terms. The premise is an incidence or deficiency of a readily apparent geometric logic in the physical arrangement of streets and blocks in plan, i.e. the composition. For example, the composition of Greek, Roman, and American settlements tends to possess such

geometries so they are regular grids. On the surface, the layouts of European or Middle Eastern 'organic' settlements lack such geometries so they are deformed grids (Karimi, 1997 and 1998; Hillier, 1999a and 2009b). This explicit and implicit description of form and process in cities is the foundation of the dichotomy since most cities are easily classified as having attributes in common with or different from others based on the degree to which they can be characterized as organic or regular. There have been frequent attempts to develop a more precise terminology, usually in better uniting or divorcing form and process as aspects of the description (Moholy-Nagy, 1968; Kostof, 1991). Such attempts tend to only lead to a plenitude of jargon that confuses as much as it clarifies in urban studies (Marshall, 2005).

The far-reaching effects of urban space having such characteristics may be in giving shape to the material world in which we live, work, and play. Hillier and Hanson (1984) argue in *The Social Logic of Space* that the physical arrangement of space "has a direct relation – rather than a merely symbolic one – to social life, since it provides the material preconditions for patterns of movement, encounter and avoidance which are the material realization – sometimes the generator – of social relations" (ix). In everyday practice, this can become complicated because of the tendency to view and design space in discrete terms, independent of its larger geographical, topographical, and/or urban context. In doing so, we often minimize, misunderstand, or even ignore the importance of design in establishing the material preconditions for our everyday use of urban space. Marshall (2005) defines this anomaly as the difference between *composition* and *configuration* to distinguish between how we view the city (composition) and how it actually works (configuration). Implicit in his distinction is the difference between a static and dynamic view of the

urban environment whereby composition is an easy-to-grasp, understand-all-at-once type of descriptive shorthand and configuration is a more complex description of relations between elements with the potential to affect urban functions. In making this distinction, Marshall (2005) explicitly seeks to separate form and process so our descriptions can provide a better understanding of the relation, if any, between these two essential components of the urban object. His goal is to avoid the theoretical dead-ends to which we are inevitably led when the differences between composition and configuration are misunderstood.

This is particularly relevant for the study of American urban space. The widespread use of the regular grid in the United States has led some to view American urban space as a neutral background against which social relations are played out. The geometric logic of physical arrangement in the American city, i.e. its composition, somehow establishes a form of egalitarian or democratic space, whereby a societal belief in the ideal that all people are equal, deserving of equal rights and opportunities, becomes embedded or reflected within the construction of space itself; in effect, neutralizing space as a factor in social relations. Copjec (1991) describes this as the democracy of the grid. The premise of this view is all locations in American urban space are equal because the metric characteristics of street length and width, block size, and subdivision of blocks into lots of equal size tend to be consistent to all other streets, blocks, and lots similarly arranged in the layout. The historical use of regular grids in the settlements and colonies of the city-state of Athens during the Greek Classical Period, the Roman Republic, and later the Roman Empire – commonly perceived as the political predecessors of American democracy and power – seems to tacitly confirm this hypothesis.

This view of American urban space is largely consistent with the prevailing paradigm view of cities in the disciplines of architecture, planning, and related social sciences during the 20th century. This paradigm conceptualizes space as “being without social content and society without spatial content,” where social relations are independent of – and unaffected by – the physical arrangement of space, and urban space is merely the residue left over between buildings (Hillier and Hanson, 1984; x). Hillier and Hanson (1984) collectively describe this as an “a-spatial domain of society” (ibid). Kostof (1991) traces the origin of this approach to 16th century Italian philosopher Giovanni Botero. Botero wrote, “the city is... an assembly of people, a congregation drawn together to the end they may thereby the better live at their ease in wealth and plenty... and the greatness of the city is said to be, not the largeness of the site or the circuit of walls, but the multitude and number of inhabitants and their power” (Botero quoted in Kostof, 1991; 227). This paradigm is an explicit rejection of the idea that “the organization of space (is) not only a social product but simultaneously rebound(s) back to shape social relations” (Soja, 1989; 57). The typical view of American urban space appears to arrive at the same conclusion by means of an entirely different logic, which is intimately tied to the egalitarian nature of American self-identity. In this case, the effects of space *are* generative and related to social relations but physical arrangement in the American city somehow neutralizes these effects because streets, blocks, and lots share some characteristic of ‘sameness.’ Urban space is only important in how the regular grid renders it into a neutral background to social relations and, thus, irrelevant to urban studies of the American city.

In terms of designing the city, this view of American urban space became so prevalent during the 20th century that the planning profession in the United

States became a social science only marginally concerned about the physical design of settlements; the act of design being conceded to architects and engineers (Boyer, 1983). Architects understood the purely semantic artistry of architectural and urban design whereas engineers understood the mechanical requirements of site design. The planning profession focused its efforts on trying to understand the relationship between socioeconomic and political factors in cities to better formulate public policy and, by implication, participate in the planning of society itself. Urban space was merely the blank canvas onto which these societal complexities were painted. According to Boyer (1983), the results for the American city were both profound and disastrous since this paradigm went to its logical conclusion. A constricted set of parameters defined the role of architects and planners, which still largely characterizes both professions today. In architecture, there was an almost zealous regard for the formal articulation of the architectural object. Since the architectural object is devoid of social content, the only limit to exploration of its composition was purely technical in nature. Planners abandoned the act of physical design and administrative planning emerged in its place. Planners became preoccupied with the administration of public policy and finances since effective intervention in the city could only occur at this more ‘social’ level. While architects submerged themselves in form, planners submerged themselves in paper, and the gulf left between the two disciplines was seemingly vast and unbridgeable. “Since architects and planners had given up trying to understand the structure and morphology of urban form and the overlaying historical and interpretative elements, they thus (inserted) new functional components randomly into the existing urban fabric” (Boyer, 1983; 287).

It was only with the advent of the New Urbanism and Geographical Information Systems (GIS) that

the planning profession in the United States slowly began to return to its origins as the art and science for the physical design of settlements. New Urbanism emerged in the late 1970s and early 1980s seeking to qualitatively re-exert the importance of architectural and urban design in creating the material preconditions for social relations (Katz, 1993; Talen, 1999; Duany et al., 2000). GIS software emerged in the 1990s seeking to quantitatively map complex socioeconomic and political data onto representations of settlements and regions (Figure 0.1).

Progress in refuting the view of American urban space as a neutral background to social relations since then has been slow but gradual. However, a cursory review of the latest architecture/planning literature and research in the United States reveals a tendency to still undervalue what Hillier and Hanson (1984) describe as the social logic of space and the spatial logic of society. The role of design in giving shape to the physical preconditions for encounter, interaction, and avoidance – the material realization of social relations – is still often poorly understood. Examining the role that urban space might play in generating social relations is only perfunctory at best. The design principles of New

Urbanism are often applied in the vertical construction of buildings while – simultaneously and paradoxically – streets disconnect from the surrounding urban context in the horizontal dimension of the site, rendering it into a pseudo-suburban development in practice even though it bears the visual appearance of a traditional neighborhood. In part, many of these New Urbanism developments do also possess characteristics of a traditional neighborhood in the horizontal dimension, whereby the layout internally maximizes intra-connectivity, i.e. street connections within the project boundary, even as it minimizes inter-connectivity, i.e. street connections to the external context (Figure 0.2).

On the other hand, the use of GIS often fosters the illusion of accounting for urban space as a factor in social relations because planning research presents socioeconomic and political data in map form. However, the mapping of this data only allows for the possibly of discerning spatial arrangement as a factor in geographical distributions – usually at a very gross level – so analysis of socioeconomic and political factors becomes effectively prioritized in the research. Batty refers to this as “the geography of locations not relations... the geography of place in

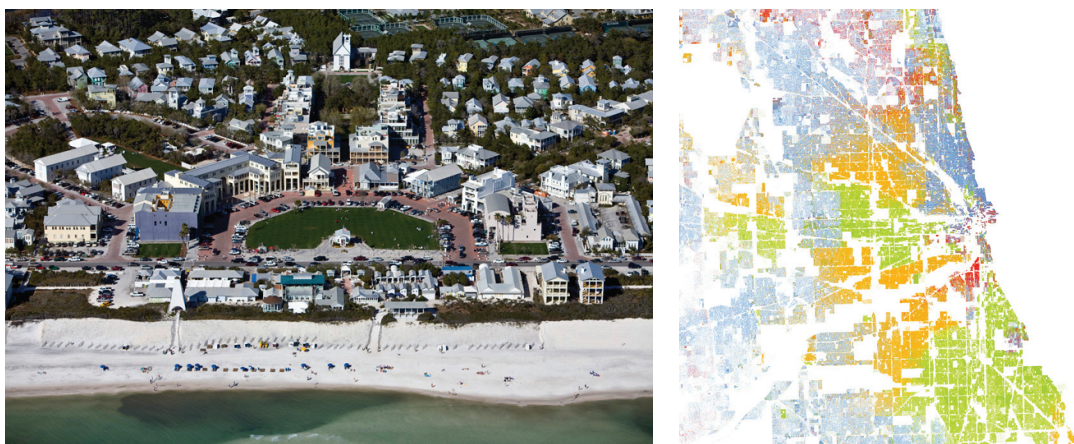


Figure 0.1 – (left) Seaside, Florida is the earliest, most renowned example of New Urbanism designed by Andres Duany and Elizabeth Plater-Zyberk (Photo: Alex MacLean/Landslides); and, (right) GIS ‘racial dot map’ in metropolitan Chicago, Illinois based on 2010 U.S. census where blue represents White, green represents Black, red represents Asian, orange represents Hispanic, and brown represents Other; each dot is representative of 1 person.

an absolute sense, represented by points, lines and polygons which enable attributes to be associated with these geometrical objects, attributes which are largely unordered. This happens because the representational basis of GIS largely avoids even the most rudimentary distortions of... space as reflected, for example, in the notion of the network” (Batty quoted in Hillier, 2005b; 7).<sup>1</sup> In this way, the prevailing paradigm of urban studies during the 20th century as a social science independent of physical design is insidiously re-exerted. Physical design remains misunderstood at best, or purposefully marginalized at worse. This is quite common in American urban theory whereby the end-result confirms the preconceived assumptions of the theorist. This greatly complicates the study of American urban space because the evaluation of competing – and often conflicting – theories becomes an exercise in conceptual ground clearing whereby we have to understand *a priori* baggage the theorist brings along with them as much as the theory itself.

GIS is a powerful tool for representing data in spatial form but it is not a theory of urban space. Nor does GIS even offer an objective description of urban space itself. It can be a useful method for discerning a spatial distribution to socioeconomic and political variables. It may even be possible that some of these

distributions can be explained based purely on these factors, i.e. unrelated to the generative or contributory effects of urban space. However, it is extremely difficult to discount urban space as a factor in such distributions without a quantitative description of the thing itself. In *The Death and Life of Great American Cities*, Jane Jacobs argues “cities happen to be problems in organized complexity” (1961; 453). If she is correct, then a comprehensive investigation into American urban space founded on, first, qualitative survey of the literature and historical town plans and, second, quantitative analysis of some historical and contemporary American cities using an objective description of space should prove useful in advancing our knowledge.

This is the methodological approach of the book. The objective description used is space syntax. Over time, space syntax has proven useful for drawing conclusions about the “social logic of space” in cities (Hillier and Hanson, 1984). Space syntax – developed by Hillier, Hanson, and Penn as well as many others – provides a measurable description of space, which can account for the factor of physical arrangement in giving shape to – and being shaped by – social relations in settlements. The principles of space syntax are relatively simple. First, space is a material in that its

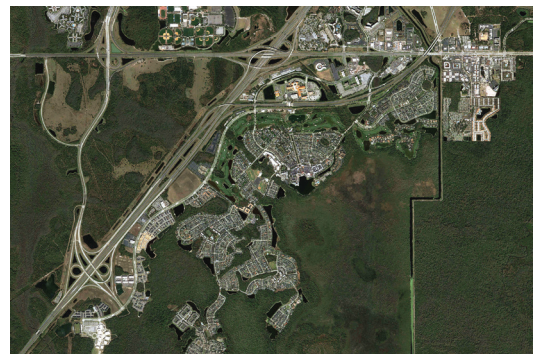
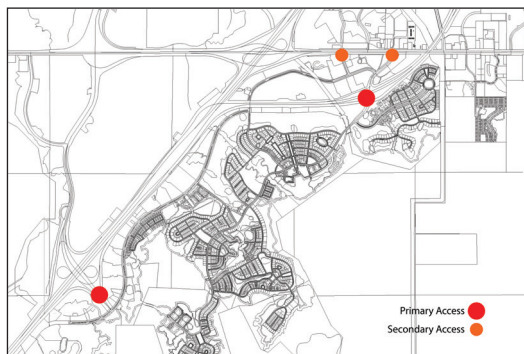


Figure 0.2 – (left) Plan showing the layout and access points; and, (right) satellite view from 8 km of Celebration, Florida. These indicate there are only four road connections to the urban context, i.e., two primary access points via a perimeter road to surrounding highways to the west/northwest and two secondary ones at street level to the extreme north of a highway.



# What is space syntax?

Space syntax is a research program.

The built environment is both a product of society and an influence on society. Space syntax aims to investigate and understand this relationship. It has developed a set of techniques for the simple representation of architectural and urban space. These representations are most usually plan-based on objective, easily understood constraints of the built environment for the most generic of human uses such as movement, occupation, and visibility. It has developed tools for modeling these representations in large spatial layouts, be it a building or city. At the most basic level, these representations will directly relate via *connection*. If you can move or see from one location, space, or street to another without accessing an intermediary one, they are connected. These days, most people create and process space syntax models in the computer. Some space syntax models of cities, metropolitan areas, and/or regions can include tens of thousands of locations, spaces, and/or streets.

Space syntax has developed mathematical measures for quantifying architectural and urban layouts as a network of spaces based on their topological characteristics, commonly referred to as *configuration*. Topology is the mathematical study of the geometrical properties of arrangement and spatial relations of constituent parts derived from set theory. Its importance seems obvious for buildings and cities in the real world. Architecture, urban design and planning professionals are preoccupied with space, dimension, and transformation of the built environment in design and policy actions. Space syntax has gathered a large body of evidence and developed theories about how the spatial and social interact. Crucially, it offers a means to test these theories in evidence-based design practice by identifying and evaluating *ex ante* (before the fact) implications of design and *ex post facto* (after the fact) use of built environments in the real world.

Space syntax is all of this... and much more.

The earliest origins of space syntax began with a 1973 article, "The man-environment paradigm and its paradoxes" by Bill Hillier and Adrian Leaman of University College London (UCL), published in *Architectural Design*. However, most people mark the beginning of space syntax with publication of *The Social Logic of Space* by Bill Hillier and Julienne Hanson in 1984. It explained the theoretical and methodological basis (in exhaustive mathematical detail in some passages) for a new way of describing and analyzing spatial layouts in buildings and towns developed during the late 1970s and early 1980s by Hillier, Hanson, John



Figure A.1 – King's Cross, London Masterplan by Foster & Partners, 1988 (Photo: Richard Davies).

Peponis, and several others at UCL. The Unit for Architectural Studies (UAS) at UCL began promoting real world applications of space syntax in design practice. Paul Coates, Stefan Czapski, and later Nick “Sheep” Dalton shepherded the dawn of space syntax in professional practice by writing and upgrading successive generations of its earliest Mac-based software packages. In 1987, UAS consulted on the King’s Cross, London Masterplan. This ‘brownfield’ redevelopment represented the first successful use of space syntax in professional practice (see **Figure A.1**). It was innovative for its day, marrying the signature Late Modernism building designs of Foster & Partners with a street layout that we would commonly describe today as traditional urbanism.

In the early 1990s, UAS was renamed the Space Syntax Laboratory (aka Space Syntax Limited). They served as design consultants for some of the highest profile projects in Europe at the time, including the London Millennium Footbridge, Tate Gallery Millbank (now Tate Britain) Redevelopment in London, Nottingham University Jubilee Campus Masterplan, and the Linz Solar City, Austria Masterplan (see **Figure A.2**).

In the two decades since the first international symposium held in London in 1997, space syntax has evolved its multi-platform software packages. They are now used in more than 50 countries around the world with well-established research centers at UCL, Georgia Tech in Atlanta, and several universities in Brazil. Researchers use space syntax across a wide range of fields from archaeology and architecture to economics and sociology to any field where you can attach ‘urban’ as an adjective, e.g. ecology, history, geography, and so on. Consultants use space syntax in the design of buildings, neighborhoods, and settlements for dozens of multi-million dollar projects, generating tens of millions of dollars in additional profits and/or revenue for the private and public sector, respectively.

Today, the most expansive use of space syntax occurs in Europe, South America, and China.



Figure A.2 – (left) London Millennium Bridge by Foster & Partners, Arup Group, and Sir Anthony Caro, 1999; (right) Linz Solar City, Austria by Foster & Partners, Richard Rogers Partnership, Renzo Piano Building Workshop, and Thomas Herzog Architects, 1999 (Photo: Lufibild Perthwieser/PTU).



attributes are describable in terms other than style or construction. Second, the arrangement of space has a logic that follows general laws, which we can analyze in terms of the ‘topological’ relation of constituent parts using graph theory. Topology is the study of geometric properties and spatial relations unaffected by the continuous change of shape or sizes of the individual elements (‘continuous change’ being a key characteristic of cities). Third, the logic of built space is social in nature.<sup>2</sup> Space syntax is based on examining the configuration of the urban object, that is the interrelation of constituent parts and the collective effects in giving rise and shape to – and being shaped by – the urban whole (Hillier, 2002 and 2003). If we really want to understand cities, then “we must learn to see them as things made of space” in strongly relational systems (Hillier, 1996b; 335). Hillier and others argue configuration is the key to how “space both acquires social meaning and has social consequences” (Hillier and Vaughan, 2007; 3).

A series of inserts or ‘asides’ in each chapter but one discusses the ideas, principles, and issues of space syntax. These asides (such as the previous two pages) represent bite size morsels, designed to ease readers into the world of space syntax without overwhelming them with the details. They run concurrently with the main story of this book, which is about American urban space. The asides provide useful information for a better understanding of that story.

### Space syntax and the American city

American cities have been a subject of sporadic curiosity in space syntax over the last three decades. Since the publication of Hillier and Hanson’s *The Social Logic of Space* in 1984, there are still only a handful of notable studies about American cities using space syntax relative to the number of studies in other parts of the world, especially Europe (Major, 2015a and c).

Most tend to focus on what Hillier (1989) describes as Type 1 laws governing the generation of the urban object though some make a conjectural leap into discussions of – or attempt to quantify – Type 2 laws governing the effects of spatial form on urban function. A few even try to discuss Type 3 laws governing the way the urban object influences society in generating a distinctive spatial culture (Hillier, 1989). At the same time, other cities of the world have been a frequent subject of intense focus for space syntax. Findings about many of those cities are broad and substantial while those for American cities remain sparse and suggestive. Twelve major American cities have been the subject of some of these studies including: Atlanta (Peponis et al., 1989a-b; Allen et al., 2001; Jiang and Peponis, 2005 and 2009; Peponis et al., 2007b; Haynie et al., 2009), Baltimore (Shah, 1996b), Boston (Raford, 2004), Chicago (Tremonto, 1993), Detroit (Psarra et al., 2013; Wineman et al., 2014), Las Vegas (Major, 1997a), New Orleans (Bone, 1996), New York (Fortes de Sousa, 1985; Stonor, 1991; Al Sayed et al., 2009), Oakland (Raford, 2003), Portland, Oregon (Howsley, 2003), St. Louis (Major, 1993), and Washington, D.C. (Fortes de Sousa, 1985) (Figure 0.3).

In the main, the purpose has been to test out whether space syntax provides a realistic picture of any particular American city on the ground. Because of this, some focus on the design and/or growth of the urban grid over time, or analyze particular design approaches such as New Urbanism and other alternative transportation modes (Fortes de Sousa, 1985; Shah, 1996a; Bone, 1996; Allen et al., 2001; Kim, 2007; Al Sayed et al., 2009; Haynie et al., 2009). Some seek to test out the proposition that space syntax can successfully predict movement flows using data compiled from observed levels of movement in an American city (Peponis et al., 1989a-b; Stonor, 1991; Raford, 2004; Raford and Hillier, 2005). Finally, others use space syntax to speculate

about the potential effects of spatial configuration on areas and neighborhoods experiencing significant socioeconomic malaise (Major, 1993; Tremonto, 1993; Psarra et al., 2013), middle class gentrification (Howsley, 2003), or pedestrian risk (Raford, 2003).

Most of the findings run the gambit for several different reasons (Table 0.1). In some, the prevailing urban studies paradigm since the early 20th century – viewing space as a neutral background to social relations – takes hold in the research and leads to an

implicit default to a-spatial reasoning when satisfactory research results are not immediately forthcoming. In others, technological and methodological limitations at the time played a role in constraining research results about American cities. Meanwhile, Hillier has been consistent about embedding American cities in the same theoretical framework as other cities, usually as ‘and this includes American orthogonal grid cities’ asides within larger arguments about urban form in general (Hillier, 1996b, 2002 and 2005b; Hillier et al., 2010). To date, Psarra et al.’s (2013) analysis of

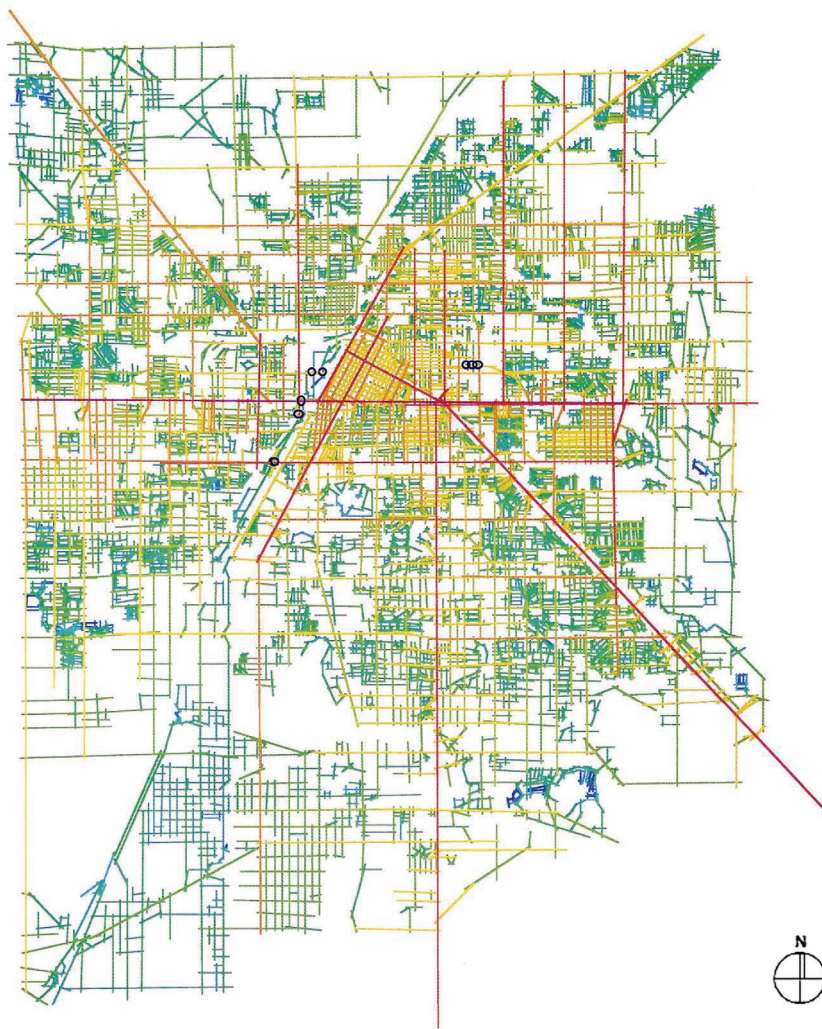


Figure 0.3 – Major’s (1997a) space syntax model of Las Vegas, Nevada showing the pattern of accessibility in the urban spatial network; colored in a range from red (most integrated or shallow) through orange, yellow, green to blue and purple (most segregated or deep) (Scale=1:300,000).