Class Eight

Urban Policy

4211/6606

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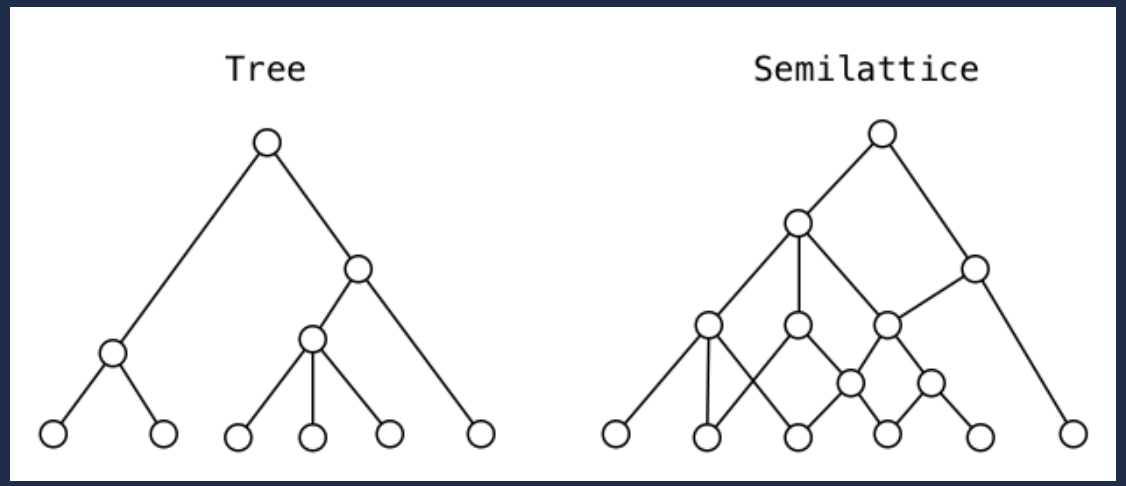
Class Nine

The Role of the Built Environment in Generating Social Outcomes

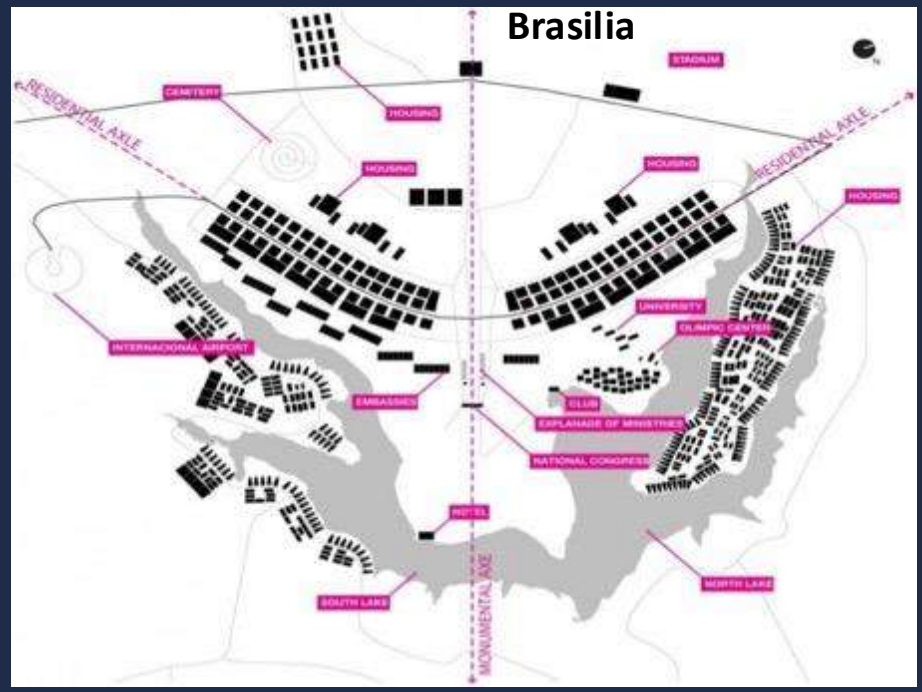
The current state of our cities emerged from a set of forces operating over generations

- Jane Jacobs was the first to point out that cities are problems of organized complexity
  - The outcomes we value “emerge” from a set of conditions
  - It is the interactions of “agents” – people and organizations – that generate healthy urban outcomes
- For cities to encourage those outcomes, they need to be functioning as a network
  - Networks rely on their physical infrastructure to effectively deliver connectivity

Christopher Alexander pointed out that cities are not structured as trees, but as semi-lattices



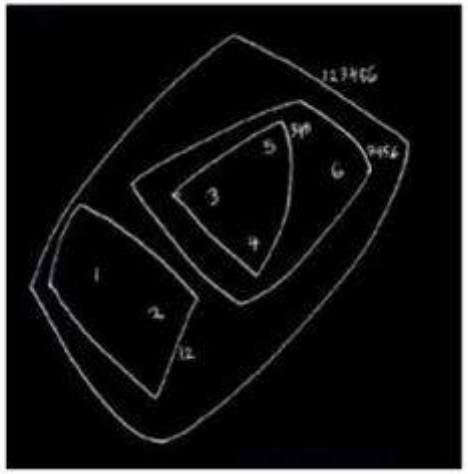
"For the human mind, the tree is the easiest vehicle for complex thoughts. But the city is not, cannot and must not be a tree. The city is a receptacle for life. If the receptacle severs the overlap of the strands of life within it, because it is a tree, it will be like a bowl full of razor blades on edge, ready to cut up whatever is entrusted to it. In such a receptacle life will be cut to pieces. If we make cities which are trees, they will cut our life within to pieces."

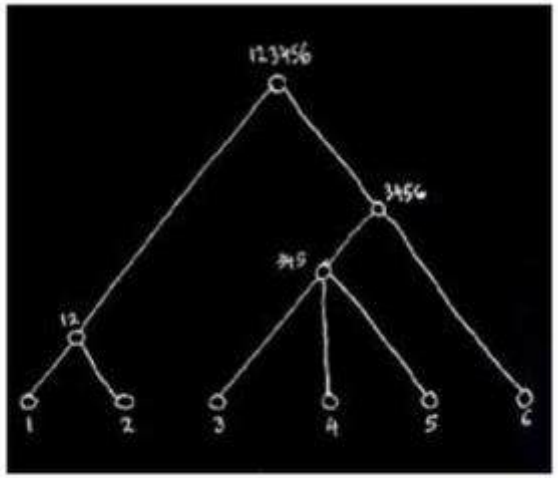


"Whenever we have a tree structure, it means that within this structure no piece of any unit is ever connected to other units, except through the medium of that unit as a whole"

Semilattices have overlapping systems within their networks

Tree

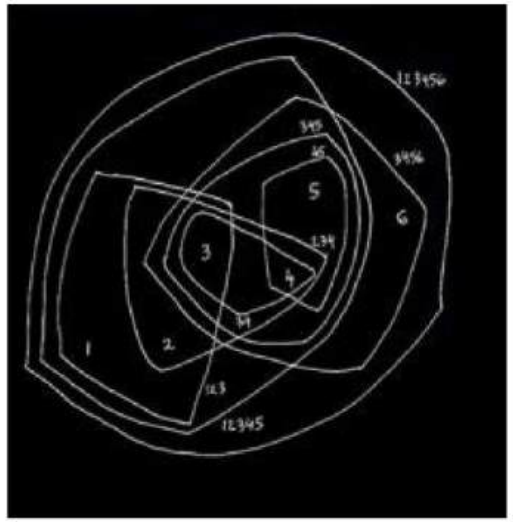


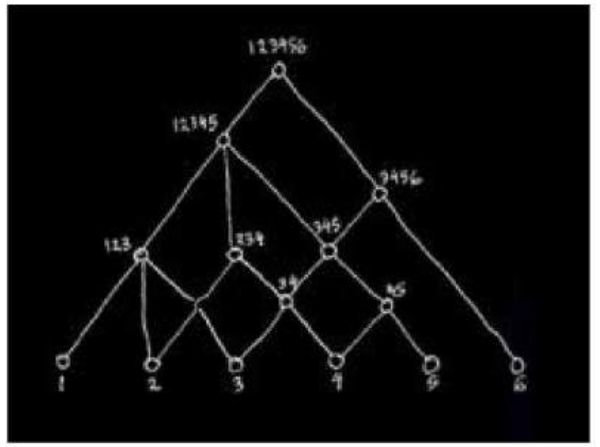


"This enormously greater variety is an index of the great structural complexity a semilattice can have when compared with the structural simplicity of a tree. It is this lack of structural complexity, characteristic of trees, which is crippling our conceptions of the city."

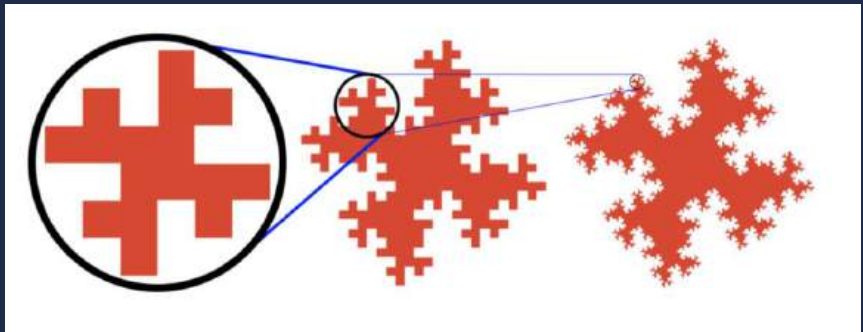
Christopher Alexander

Semilattice





Semi-lattices are fractals, meaning that they are self-similar



- Fractals fill the space within which they are contained
- They reside between conventional dimensions
  - Sierpinsky triangle has a fractal dimension of 1.58

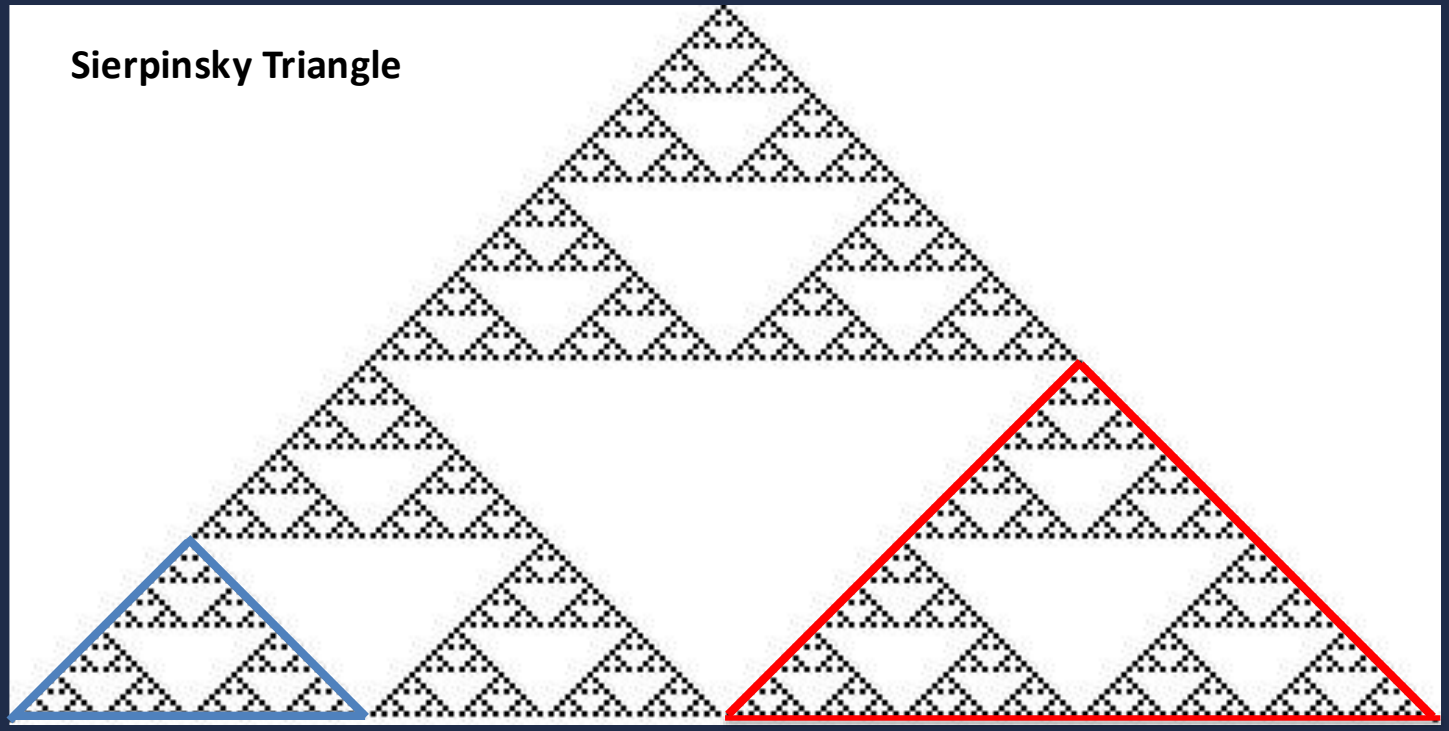
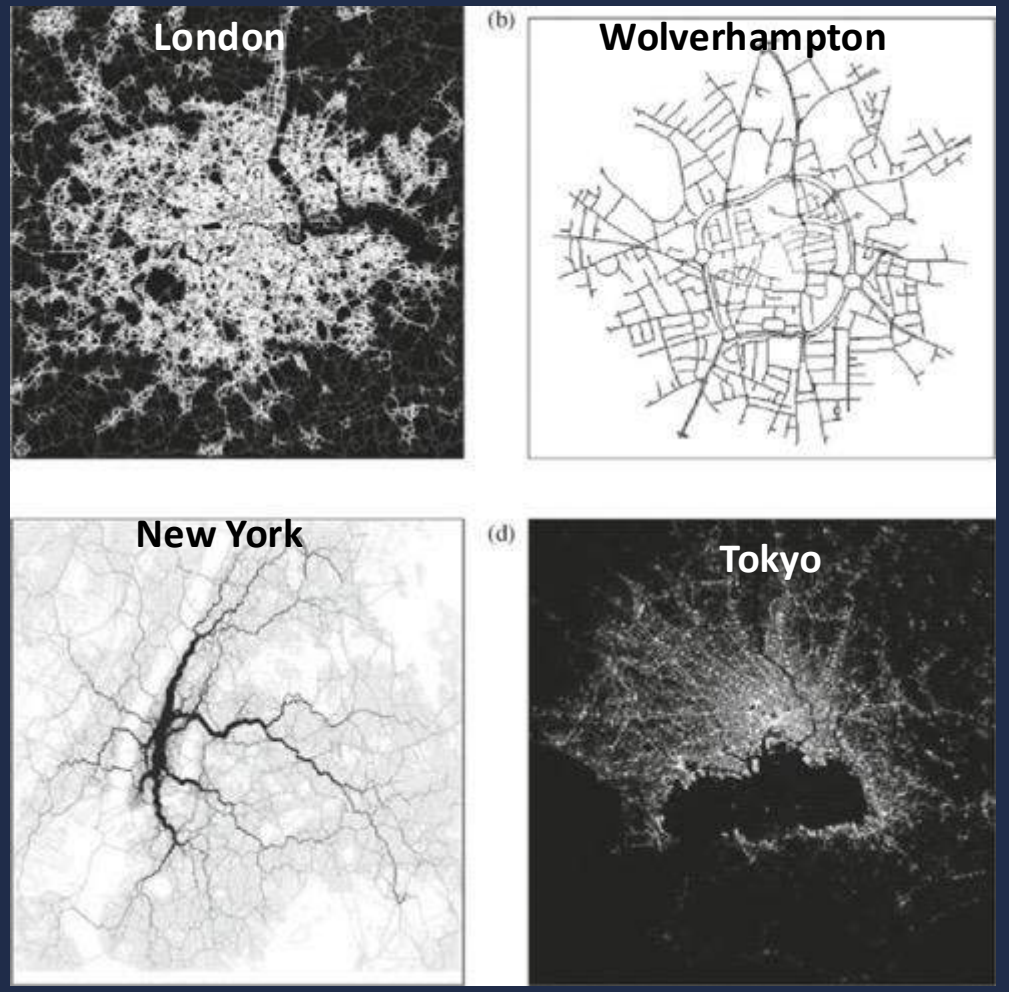


Figure 4: Sierpinski's Triangle retains its core characteristics regardless of the scale at which it is observed

Cities are fractally geometric, which provides a means to assess the degree to which they provide connectivity

- As cities evolve over time, they tend to spread “out” and “in” simultaneously
- Overall area of the city grows, but the density also increases
- But there are constraints that impede this process
  - Natural barriers (water, topography)
  - Artificial barriers (zoning laws, building technologies)
  - Social dynamics (economic disruptions, social attitudes, adoption of new transportation technologies)



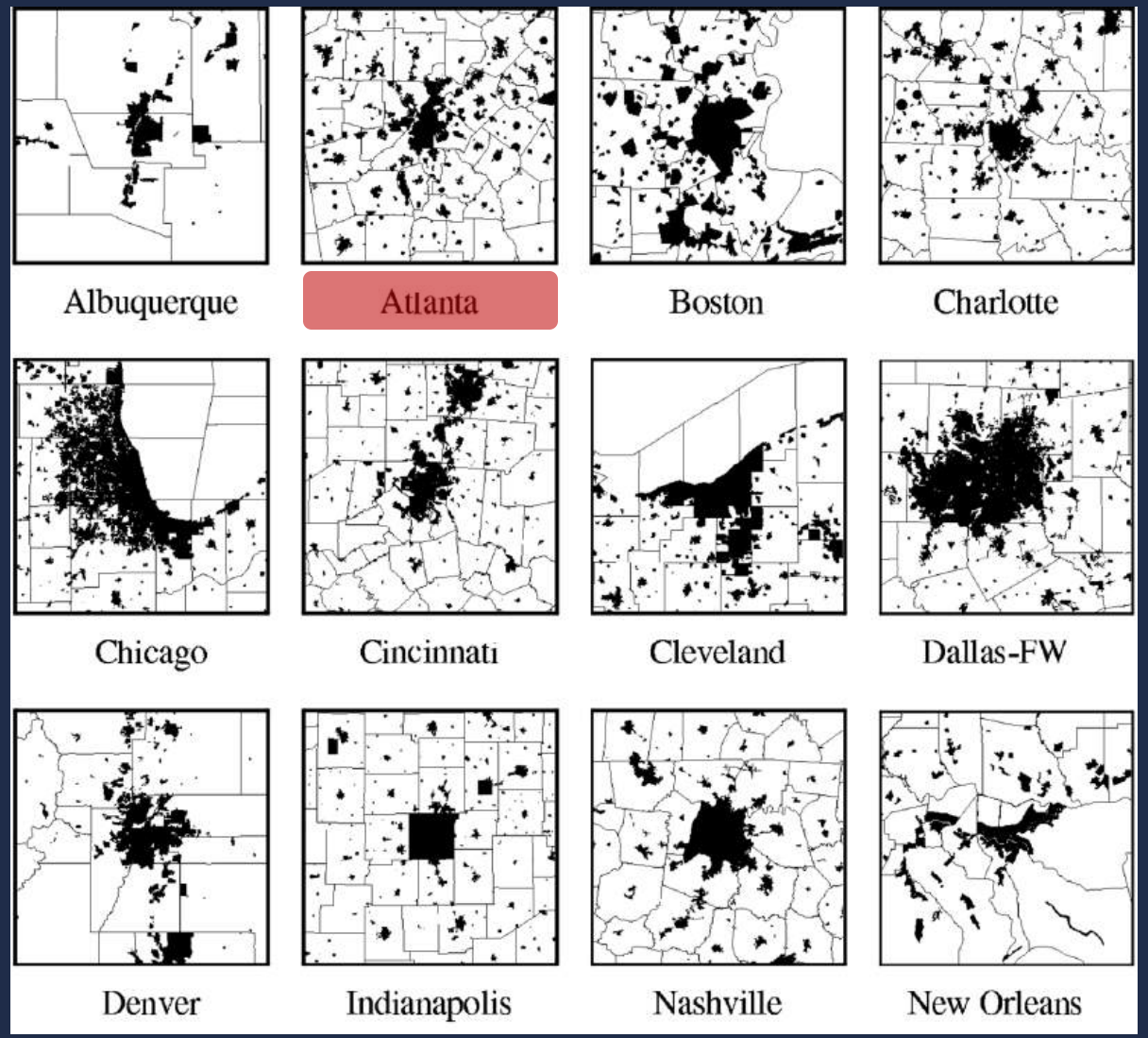
The fractal dimensionality of a cities is most obviously revealed in the infrastructure that serves it

London Underground System

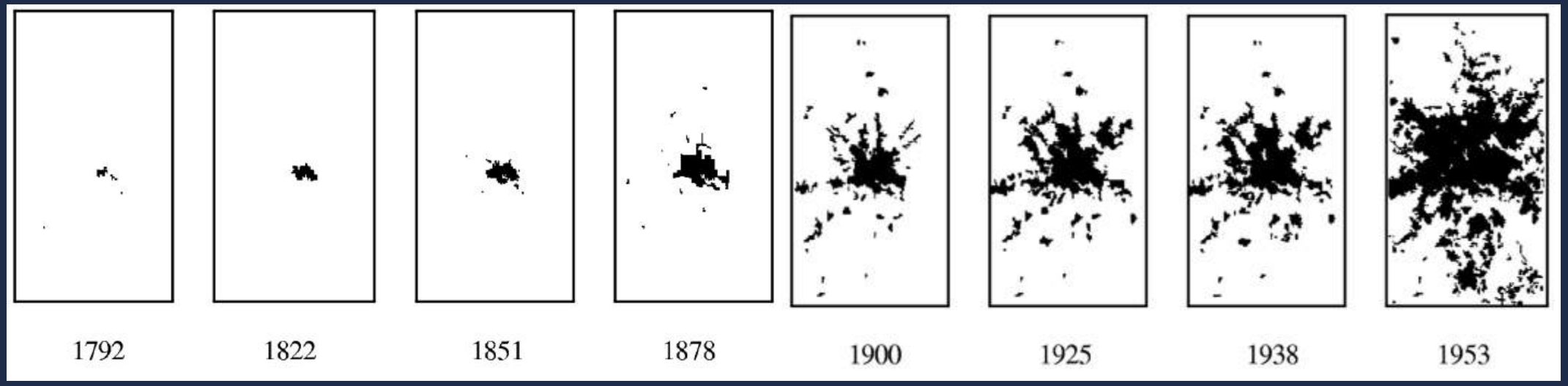
Fractal dimensionality of US cities varies considerably

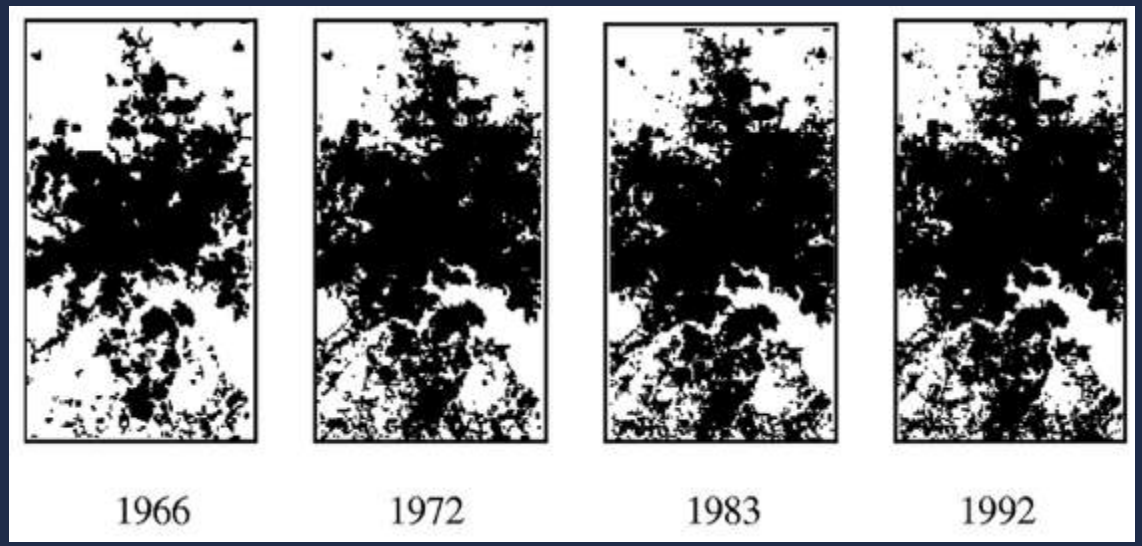
Fractal Dimensions of Major US Cities

New York City, NY	1.7014
Dallas-FW, TX	1.6439
Chicago, IL	1.6437
Phoenix, AZ	1.6388
San Francisco, CA	1.6285
Boston, MA	1.6022
Cleveland, OH	1.5869
Oklahoma City, OK	1.5660
Seattle, WA	1.5473
Denver, CO	1.5114
Pittsburgh, PA	1.4981
Nashville, TN	1.4973
Atlanta, GA	1.4950
New Orleans, LA	1.4745
Cincinnati, OH	1.4666
Charlotte, NC	1.4643
Albuquerque, NM	1.4294
Tulsa, OK	1.4250
Indianapolis, IN	1.4129
Omaha, NE	1.2778



The fractal dimensionality of Baltimore can be seen as it grows over time





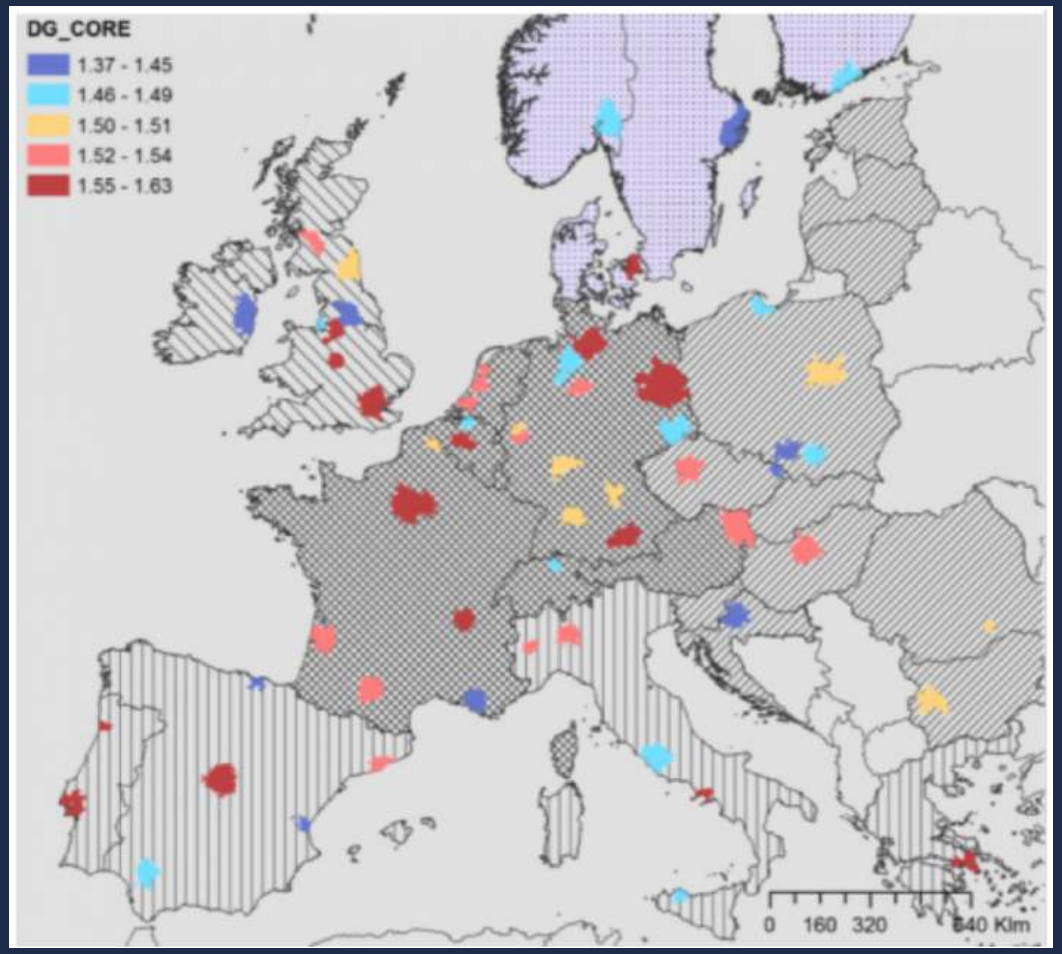
The fractal dimension is an indicator of a city's ability to provide connectedness

- Fractal dimension captures some characteristics of the complexity of urban development patterns

"As we learn more about how cities evolve in these ways, it is my contention that **we will learn to plan less** as we identify points of pressure and leverage. There, **effective intervention and design in small, incremental ways might lead to large and effective changes** that go with the flow, and do not fight against the grain. Such planning through incremental evolution has not been the history of most city plans hitherto but our science is evolving to meet this challenge."

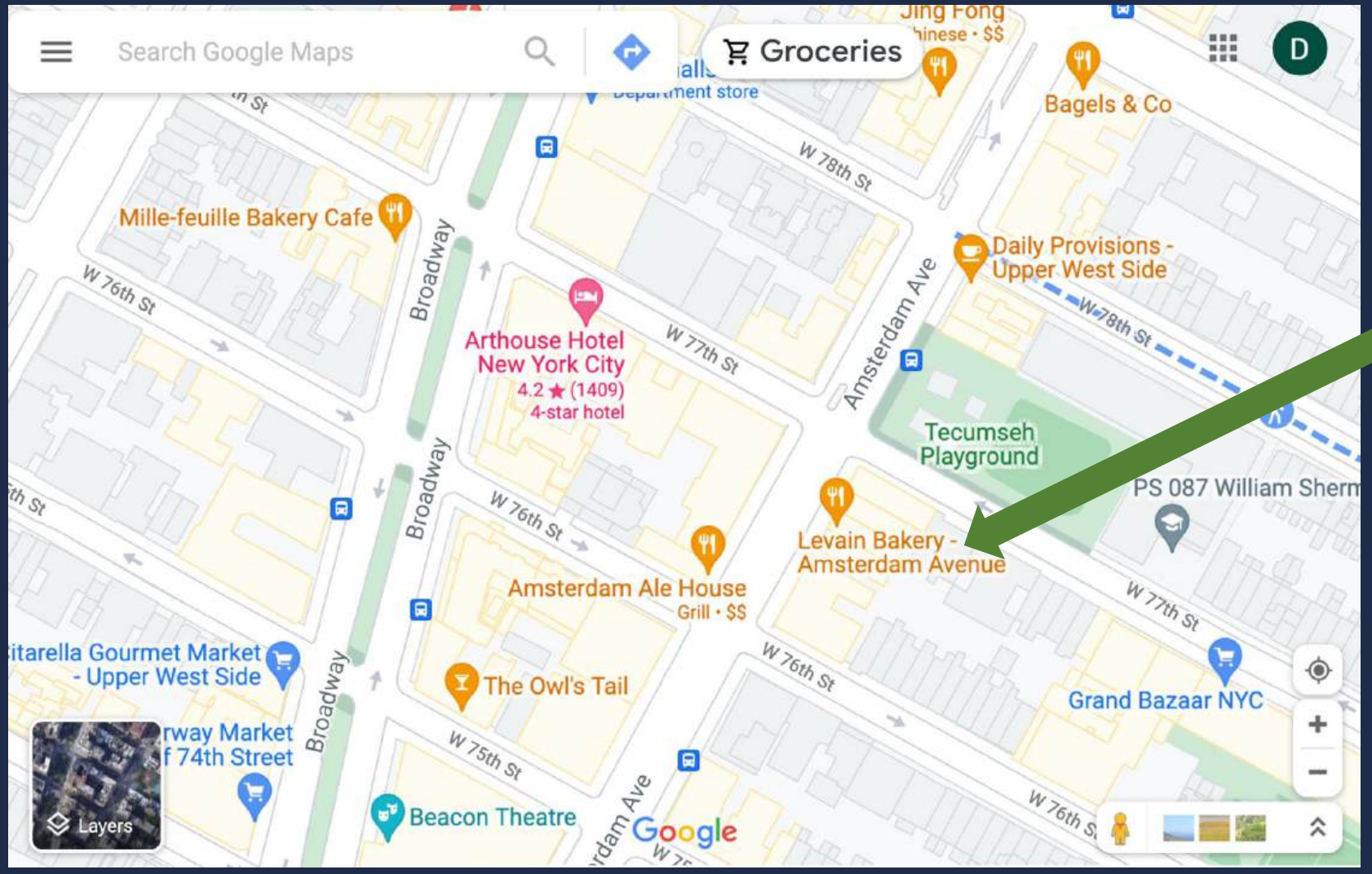
Michael Batty

Fractal Dimensions of European Cities

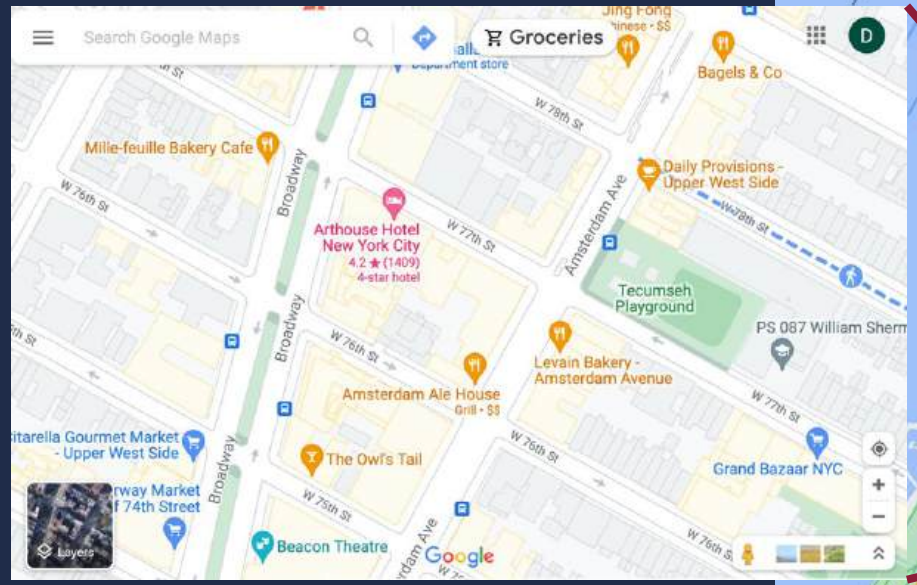


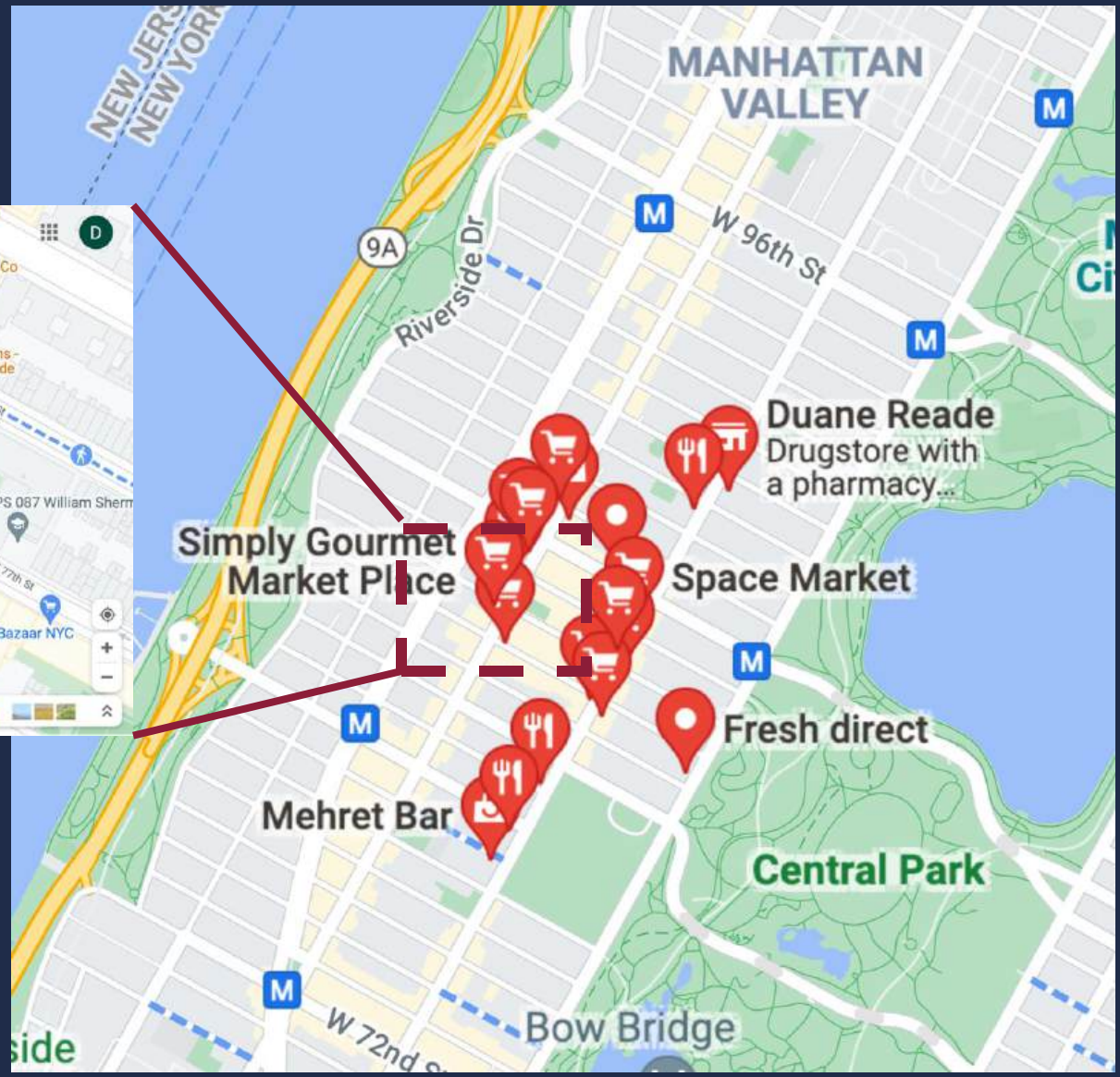
Poulicos Prastacos (2021) "Fractal Dimension Of European Cities: A Comparison Of The Patterns Of Built-up Areas In The Urban Core And The Peri-urban Ring"

Think of a neighborhood as a building block of a fractally geometric system



But a neighborhood is a nested layer within a larger urban hierarchy



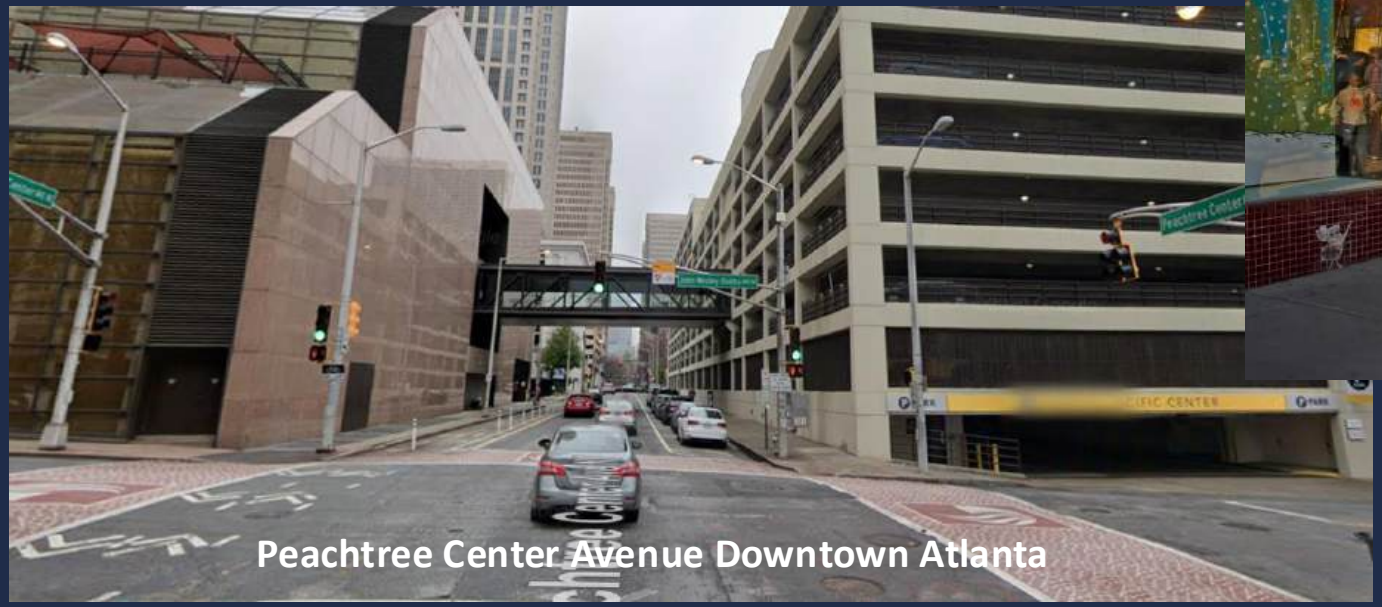


- Hierarchies are self-similar at varying scales
- Self-similarity enables system redundancy
- Redundancy protects system from external shocks

Poor design can undermine the advantages of fractal dimensionality at each hierarchy

- Little Five Points emerged at the intersection of two trolley lines at the turn of the twentieth century
- The intersection evolved into an attractor for the area; effective conduit of information
- Is highly resilient in that sense due to its redundancy and malleability (the built “stuff” is supple and not stiff)

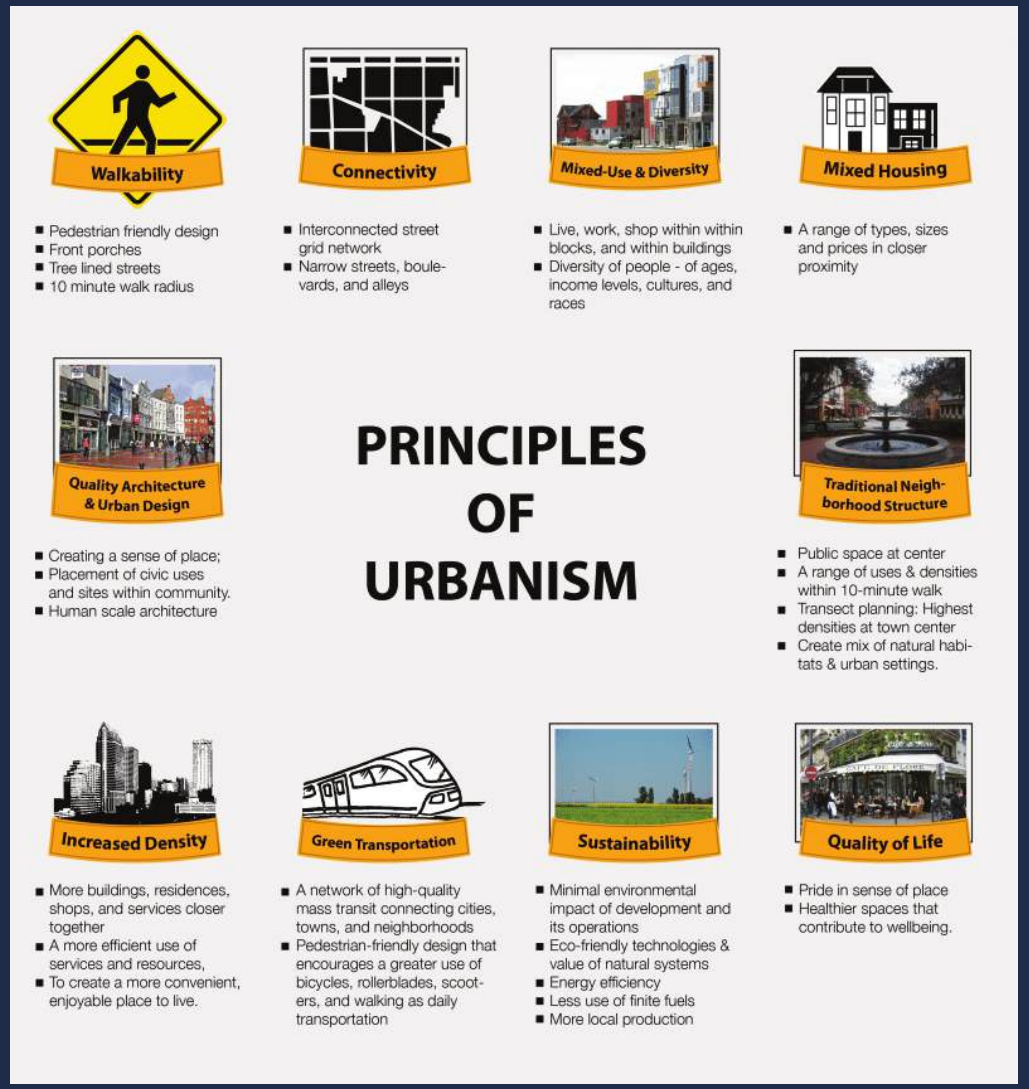
Little Five Points Atlanta


Peachtree Center Avenue Downtown Atlanta

New Urbanism is an attempt to codify the principles of human-centered urban settings

- Promote human flourishing through design of the built environment
- Challenge is that thriving urban environments evolve into existence, they are not designed
  - Lack “authenticity”
  - Jacobs: “The places they have built, they don't seem to have a sense of the anatomy of these hearts, these centers. They've placed them as if they were shopping centers. They don't connect”
  - Inadequately grounded in bottoms-up forces

“The valued city is not an ordered one, but one that can be ordered – a complexity whose pattern unfolds.”
Kevin Lynch

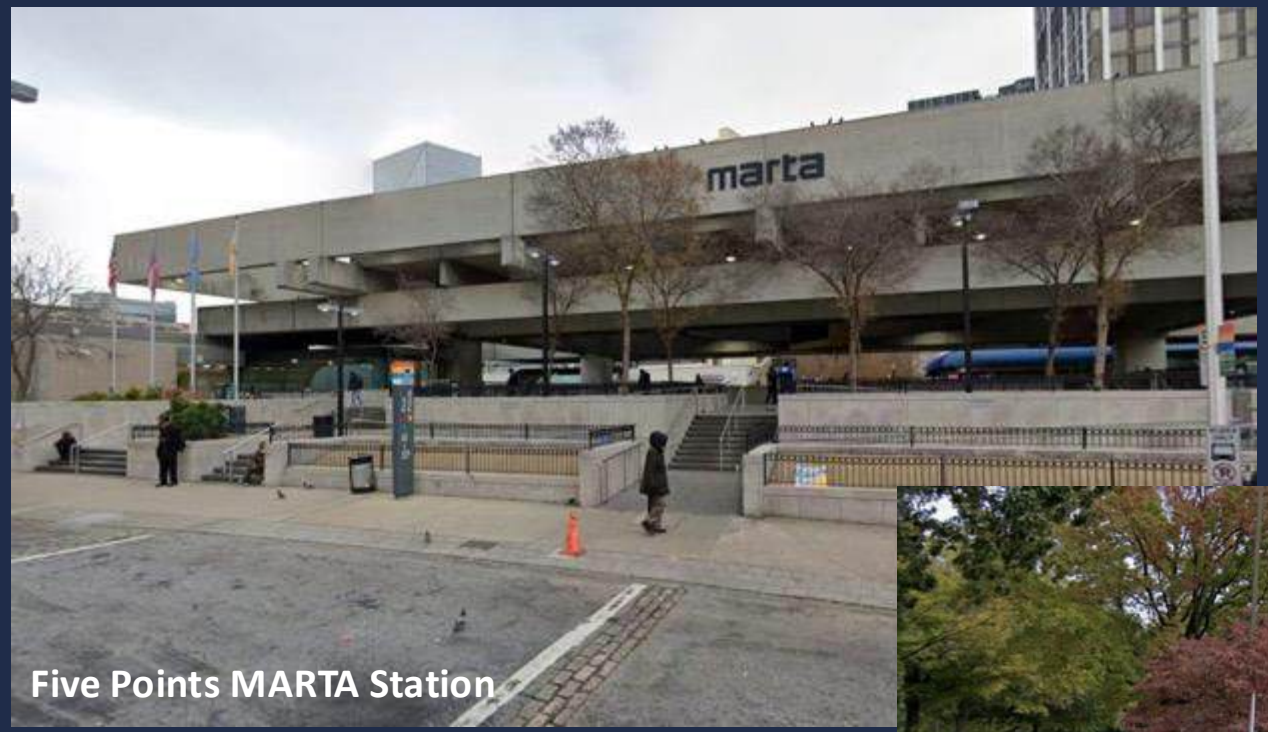


Urban settings are dynamic, shaped by bottoms-up forces

- It is the dynamism of urban spaces that create the conditions necessary for the emergence of the outcomes we care about
- Agents shape the environment by eliminating frictions as they seek connectivity
  - Pathways, nodes and hubs arise independently as cities evolve

Modified Lynch:	Formal Features	Related CNU Features	Embodied CAS processes	Ecosystem Examples
Paths	Street Networks	Distinct and pleasant walking streets, transport options (CNU 8, 10, 12, 14, 22)	Evolving **Networks** that effectively channel flows or agents.	Channels of resources flowing through an environment (streams, sun- paths, ground nutrients, foraging trails)
Cells	Typical grain of urban fabric (shops, homes, etc.)	Provision of finer grain (walkable) built fabric density (CNU 15, 21,24,27)	Multiple, parallel **Agents** testing strategies that maximize resource use and minimize frictions	Evolving populations of species exploring fitness strategies (birds, insects, mammals).
Hubs (Landmarks and Nodes)	Gathering places (plazas, schools, churches, squares, etc.)	Differentiation in hierarchies, provisional of public gathering spaces (CNU 16, 18, 23, 25)	Emergent **Attractor States** where flows tend to gravitate, regardless of their origin. Sites of minimum energetic resistance. Occur at multiple scales.	Sites where flows converge (nests, ant hills, dens, etc.) Areas with high densities of resources – ie. Food /fuel source sites (ponds, nutrient sinks, etc.)
Edges	Urban Surfaces: Public Private interface: (Street displays, hard or soft surfaces)	Clear and cohesive street boundaries (CNU 6, 17, 19)	**Information** signals that mark productive agent behaviors and broadcast and break potential system symmetries.	Signals coordinating behaviors within a species (*pheromone trails, mud deposits in termite mounds, geometry of honey cells in hives, etc.).*
Districts	Complimentary zones or clustered use areas (antique districts, gallery precincts, etc.)	Neighborhood and District coherence (CNU 5, 10, 27)	**Self organized emergent Global Patterns** (assemblages) that efficiently circulate and coordinate resources, minimizing frictions.	Patches of species synergetically inhabiting a particular ecosystem environment,

MARTA station design is an example of introducing stiff infrastructure at important nodes



Five Points MARTA Station


Inman Park MARTA Station

Rail stations that facilitate connectivity enable active nodes

The built environment can either help or hurt healthy urban dynamics and the emergence of preferred outcomes

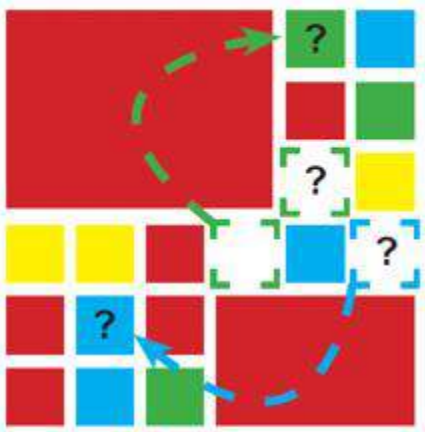
Agents advance their objectives by making independent choices based on their unique schema…

… and those choices are impacted by the network infrastructure through which they must navigate…

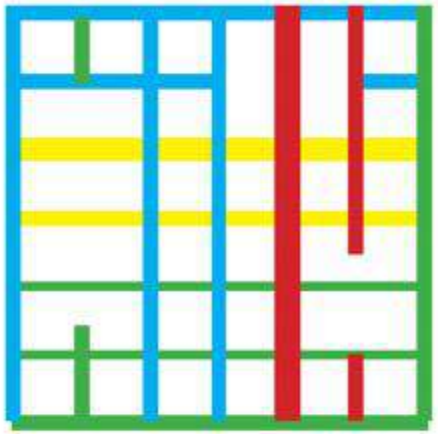
… which delivers signals (information) in feedback loops that lead to newly adaptive schemas…

… that coalesce around attractors within the environment through a process of self-organization…

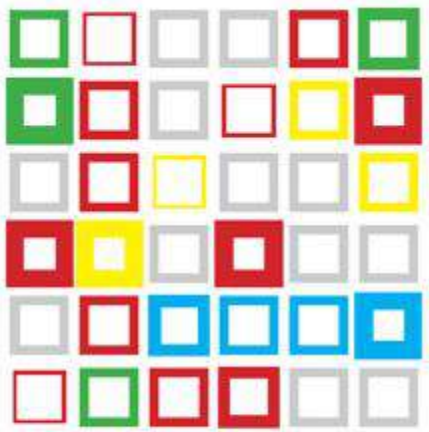
… which lead to emergent behaviors that could not be predicted in advance and that lack identifiable causes



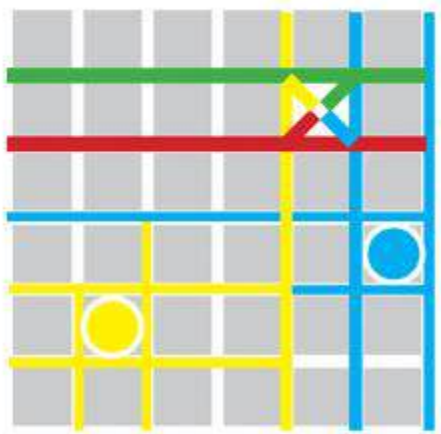
CELLS/AGENTS:
Is the scale/malleability of the urban grain conducive to itertively exploring multiple program manifestations?



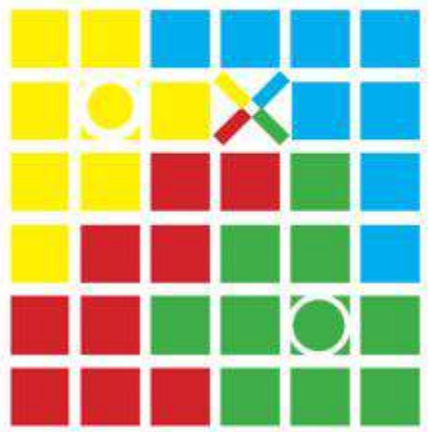
PATHS/NETWORKS:
Are flows uninterupted, and are there flows of different types, intensities, redundancies? Is the network that supports flows responsive and adaptive?



EDGES/INFORMATION:
Is the viability of use/program made transparent through signals in the environment? How strong/reliable are the signals?



HUBS/ATTRACTORS:
Are there neighborhood areas where similar flows can coalesce into nodes? Are there district level areas where diverse flows can merge as landmarks?



DISTRICTS/EMERGENCE:
Is the emergence of functionally synergetice or contiguous program elements manifested?

Scott Ball is an architect and urban designer

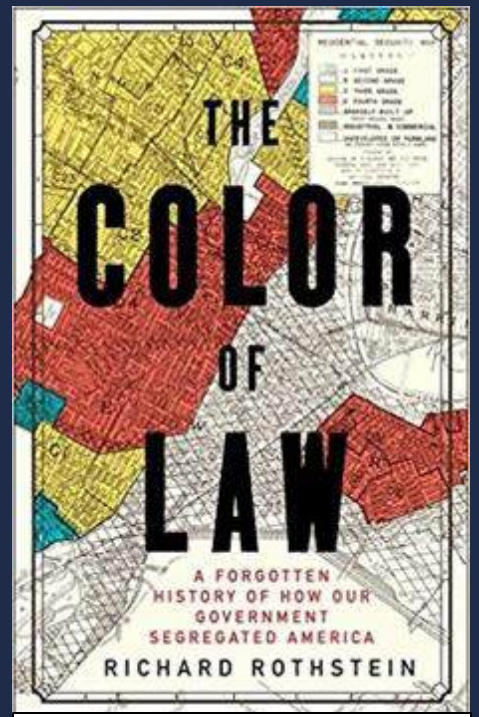
- Scott is the co-founder of PerchBuilt, a design and build firm with expertise in planning, architecture, and construction
- Scott holds a Master of Architecture Degree from Yale University and earned a Master in Fine Arts from Bard College (he is a sculptor at heart)
- He also has served as
  - Executive Director, Community Housing Resource Center
  - Principal, ICF International
  - Senior Project Manager, Duany Plater-Zyberk & Company
  - Principal, Commons Planning

Segregated neighborhoods of concentration poverty are the most obvious evidence of our failure to advance racial equity

- Combination of public policies and private actions have created neighborhoods of concentrated poverty in our cities
  - Racially segregated public housing
  - Exclusionary zoning laws
  - Redlining
  - Restrictions on FHA guarantees
  - Court orders to evict Black homeowners in areas with restrictive covenants
  - Public institutions' promotion of restrictive covenants
  - Failure to enforce laws against mob violence
  - Licensing of real estate brokers imposing segregation in real estate transactions
  - School zone attendance boundaries that segregated schools
  - Highways built through Black neighborhoods
  - Discrimination in the protection of labor market rights

"We are living with with the legacies of a *deliberately* segregated past."

john a. powell
Director, Haas Institute for a Fair and Inclusive Society
University of California at Berkeley



"Undoing the effects of segregation will be difficult, but we will first have to contemplate what we have collectively done and accept responsibility" – Richard Rothstein