# A Smart City Anomaly: The Near Becomes Far, The Far Becomes Near

Ronit Purian*
Tel Aviv University

*Social change that results from new information and communication technologies is manifesting in the form of cities. A major body of literature has been dedicated to characterizing the structure of the networks formed by roads, buildings, landmarks, and other elements in urban environments. While most research in the field is dedicated to centrality, connectivity and integration, previous studies were focused on physical separation as the feature that best expresses socioeconomic segregation. This study adds a global layer to the local barriers, developing a 'theory of smart city form': urban networks that connect the far and separate the near, eliminate physical distance yet leave physical traces. Significant shifts are occurring in both global and the local processes associated with morphological separation within cities and information flow between cities. Smart cities, global citizens, and urban networks materialize a global regime of competition and innovation that tends to overwhelm local processes of socioeconomic integration and social mobility. Beyond the digital divide and digital literacy, new ecosystems of software development lead innovation in ways that connect the similar while neglecting distance and excluding closer but dissimilar social groups. The establishment of two layers of reference, the local and the global, aligns with the impact of technological progress on the generic city and helps to specify the origins of separability, and the persistence of segregation and displacement. Global connectivity is outward-interconnected but inward-disconnecting. This paper reviews findings to identify this anomaly in global cities and concludes with a theoretical review to frame the proposed explanation for sharp divides in closer proximity. The myth of move fast and break things is not over yet in the accelerating globalization era where cities are connected and forced to move fast.*

***Keywords:*** *Complex systems, displacement, gentrification, global cities, globalization, integration, segregation, spatial cognition, spatial behavior, urban morphology, urban planning*

* Environmental Studies Department, Urban Innovation and Sustainability Lab, Porter School of the Environment and Earth Sciences, Tel Aviv University, Israel. purianro@tauex.tau.ac.il

## INTRODUCTION

Urban form is recognized as a main organizing force in city life. As cities grow, the nature of urban form is constantly transpiring, shaping societal conditions, and being shaped by them. What are the global and local processes that precede morphological separation in cities? What is the impact of the accelerated pace of information technologies (IT) implementation in various layers of city life? This paper proposes a perspective to describe and interpret changes in the spatial configuration of cities, viewing cities as part of the IT artifact.

The way we organize the form and the elements of our urban life depends on technological changes. The new ecosystem of applications is interlinked with economic processes, globalization and digitization, and the influences of global cities on local problems that citizens face today (e.g., Hopkin, 2020; Kostakis & Bauwens, 2014; Zuboff, 2015).

The technological revolution of personalized services affected the behaviors of individuals in different socioeconomic groups and communities. Urban behaviors and personal applications will be presented herein to actualize the axis of urban technologies. For about a dozen years technological innovations are increasingly accelerating and establishing unprecedented power, continuously evolving through significant leaps forward such as virtualization, stabilizing communication networks, code sharing, and other innovative infrastructures that alter phases of product development and programming. The technological progress goes beyond the diffusion of new digital products. A new ecosystem of software development drives the local and the global changes for more than a decade, and further accelerating in recent years.

Similarly, the global networks that constitute the industries and the sectors of software development advance the flows of people and money across cities and nations. Local citizens and local economy now compete with global corporations that lay networks of headquarters and interconnected institutions and affiliates, and gain an unbalanced advantage over the nation state. In view of urban networks throughout history, globalization today increases the divide between centers of world-cities and a periphery of urban and rural areas. A worldwide hub of hubs sets the digital divide of technology utilization and appropriation (Al-Natour & Benbasat, 2009), beyond the adoption and the acceptance and use of new technologies, and effectuates a transfer of power from countries to global cities and global citizens.

Technology intensifies inequality and – rather than connecting – a network economy of personalized on-demand services, based on mobile applications, may unchain individuals and communities. Increasing gaps in education, digital skills and earning capacity transform the landscape of economic competition. The promise of the sharing economy, originally aimed at mutual provision of services, is currently misutilized in a platform economy where the winner-takes-all as of insufficient policies and regulations (Acquier et al., 2017). New arrangements of public-private partnerships (PPP) are therefore required to prevent biased and unfair competition (regulation often arrives after the market had been exploited by the most aggressive

player, as has been the case in different cities and service sectors). Research on privacy and surveillance can scrutinize part of the process as done, for example, by Elkin-Koren & Gal (2019). The additional layer is the physical realm, the place-related consequences, such as patterns of mobility in urban spaces and the actual structure of streets and buildings. When urban players differ in their relative acceleration, and violate principles of proportional control, segregation and displacement become an immense threat. The principles of fair play are needed to maintain a near-constant speed range, regulating the flow in an era of scaling cities *and* platforms.

In addition to the axis of urban technologies and the related actions and behavioral patterns, global networks of cities and citizens play a role in the axis of urban planning. While globalization is not a single factor to polarize society, the global edge – the advantages of being globally appropriate –extends the divide and may be the hidden force underneath gentrification and displacement (Fiske & Haslam, 2005; Psyllidis, 2016). This paper has three main parts: (1) the extent and scale of spatial separation in cities along the century, up to the smart and global cities, will be described – this would be the local level of domestic proximities within the city; (2) this is followed by the state of global cities and the case of Tel Aviv; and thereafter (3) providing possible explanations to pinpoint principles in the creation of the system that eliminates distances between global cities, while excluding closer but dissimilar social groups in the city.

This is not to say that the global network of urban hubs discriminates against local communities intentionally but to describe a continuous transition from a homogenous city through the post WW2 multiplicity, as determined by rent gradients, and the increasing heterogeneity, as the course of transition outward to the suburbs was inversed inward to the post-industrial fragmented city, and then again from gentrification that rejuvenated neighborhoods to displacement that further introduces irregularity in a patchwork metropolis, a heterogenous city where information flows ignore near companions while connecting the far in no time. The mechanisms of information flows that originated in a market economy reflect a rather simplistic system of strong and weak groups, in a financialized world (Castells, 2010; Hacking & Hacking, 1999; Hopkin, 2020; Kostakis & Bauwens, 2014; Piketty, 2014; 2015; Polanyi, 1944). However, the paper is focused on the impact of technology on the spatial behaviors and the spatial structure of the city, stating that separating elements are the *local* result of the same sociotechnical dynamics that connect the far *globally*. Thus, the purpose is to illuminate:

- How spatially distinctive are the differentiated spaces in cities, whether moderate variations between adjacent neighborhoods turn into sharp divide in closer proximity.
- Why global connectivity is outward-interconnected but inward-excluding, and how connected and confined cities are.

In the absence of a pro-social regime, information and communication technologies (ICT) abolish the Euclidean distance between spaces while enhancing so-

cial discrimination against near places; neglecting social implications or choosing to exploit stakeholders (e.g., Geissinger et al., 2020). Real public engagement and reciprocity, the discourse ethics of a communicative action (Habermas, 1990; 1998; Mingers & Walsham, 2010), which are crucial constructs for trust building (Purian, 2012), miss in the relatively new ecosystems that cultivate unstoppable on-demand for-profit applications that fail to recognize mutuality and benevolence. Competent agents are expected to apply ICT for better *information and communication* processing, as the name ICT suggests; to store, inform and connect, not to confuse and disconnect.

First the morphological evolution of cities since the days of concentric zones is presented, followed by a review of methods and tools to define and measure urban morphology, and distinguish the feature of physical *separation* and segregation.

## SEPARATION IN FOCUS

The spatial fragmentation of cities has been described qualitatively and quantitatively, in relation to physical and to socio-economic characteristics. The combination of both layers is established in studies that measured the spatial manifestation of socioeconomic differences. To a lesser extent have the spatial *determinants* of socioeconomic differences been studied. The importance of *separating* spatial features on social integration will be emphasized as opposed to, e.g., connectivity or centrality.

The order of separation – in the built environment and in daily activities – is a basic layer within which to understand and resolve the dichotomy of values versus opportunities. The outward shift of wealth to the suburbs has been inversed (Ehrenhalt, 2012), but the resulting structure of the metropolis is not necessarily a unifying bricolage of diverse neighborhoods. On the contrary; while the global cities create a global network of "mega nodes" (Castells, 2010, 2743), the central core and the suburbs become farther apart; rather than relating, near things were separating.

What are the components and factors that shape social relationships in neighborhoods, cities and regions today? Urban planning involves many preferences and alternatives. A major challenge is to transform the "tension or equilibrium between the two forces" (Arrow, 1974, 17) into design with the benefit of society in mind.

The structure of the separated patches, as evident in big cities, is presented first. After the morphological description in section 1 ("The structure of cities: Increasing irregularity"), the current state of global cities and urban areas is presented in section 2 ("Gentrification patterns vs. displacement disorder"), and next is the theoretical reasoning in section 3 ("Elevations all the way up: Vertices isolated with technology and information"), to address the bifurcating course of transitions. Why has residential differentiation exceeded the potential for spatial integration? A new form of segregation invites us to apprehend urban dynamics.

### *The Structure of Cities: Increasing Irregularity*

The morphological aspects of urban life receive much attention in recent years. The spatial structure of US cities was studied along the years. Hackworth (2005) showed how the distance from the city centers, in the ten largest US metro areas, changed the distribution of population density, rent, average home value, and per-capita income, from 1970-2000. Metropolitan polycentricity was intensified, compared to outer areas (Hackworth, 2005). In other words, urban growth and the resulting "megapolitan region" (Lang & Knox, 2009) do not imply spatial connectivity and urban integration.

#### *Homogeneity and Multiplicity*

The urban prototype of an inner district that expands and creates peripheral rings has evolved since Burgess (1925) who described a series of concentric zones in Chicago, unfolding from a core business district to residential, working-class, middle-class, and the suburban commuters. The radial structure was replaced by a sectorial pattern of residential and non-residential areas along transportation routes. The sections, however, still originate in city centers, according to Hoyt (1939) who proposed the morphology based on rent gradients in US cities. The multiple nuclei of growth are revealed in the integrating model presented by Harris & Ullman (1945), with different business, manufacturing and residential districts that have no specified beginning.

Unlike the concentric zone and the sectoral model of residential patterns, Harris & Ullman (1945) do not assume that there is "a single urban core, around which land use is arranged symmetrically in either concentric or radial patterns" but suggest that because of actual physical constraints and the existence of separating factors, "separate nuclei" arise. The specific separating factors are not only high rent in the core, which can be afforded by few activities, but also the natural attachment of certain activities to extra-urban transport, space, or other facilities, and the advantages of the separation of unlike activities and the concentration of like functions" (Harris & Ullman, 1945, 17). Thus, they emphasize the impact of "separating factors". However, not much research has been carried out on the separating factors, physically driving the growth of discrete nuclei and originating new pockets of wealth and poverty.

#### *Heterogeneity and the Transition Outward: Suburbanization*

The concentric zone (Burgess, 1925), the structure of sectors produced along transportation routes (Hoyt, 1939), and the integrating model of multiple nuclei (Harris & Ullman, 1945) are urban models of relatively homogeneous areas. However, the outward course of transition to the suburbs delineated the economic mobility and heterogeneity. The dynamics of heterogeneity is deeply rooted in the Schelling model (Schelling, 1969; 1971) and the vast research area that developed since. An extensive body of literature had investigated aggregation and segregation processes, from bottom-up and top-town viewpoints.

The many variations of the Schelling model provide a useful knowledge-base that demonstrates the strength of individuals' preferences, e.g., the level of satisfaction in non-optimal states; and of constrains such as the size and proportion of populations and neighbourhoods; as well as the complex relations between micropreferences of individuals and the macrobehavior of the whole area (Benenson & Torrens, 2004). The thresholds in each choice model, the greediness in the pursuit for "happiness" (NetLogo's term for satisfaction, to be achieved in a homogenous "like me" neighbourhood), and other options (e.g., lock in) determine the course of the transitions' outbreak and its decrease and termination.

The rapid suburbanization since the 1950s generated low-density neighborhoods that perfectly matched Schelling models. As Batty (2018) states, suburban development was inevitable, as growth was "faster than any possible increase in density within the existing city" (Batty, 2018, 137). Growing outward was one aspect of urban sprawl. In addition, the spread of city functions had consequently engendered the decline of existing city centers (Batty, 2018; Whyte, 1993). And so, the attack on urban sprawl was not only about the low densities of remote suburbs, but also about the decay of city core. The downtown lost functions and changed structure. Moreover, as claimed by Jane Jacobs, one of the most prominent voices against suburbanization, a new regime of high-rise buildings along freeways was replacing high-density low-rise buildings that integrated neighbourhoods. Thus, the criticism had emphasized the isolating nature of the new city structure.

*Heterogeneity and the Transition Inward: The Patchwork Metropolis*

The structure of cities, megacities and superstar cities (Gyourko et al., 2013) is changing from a construct composed of central quarters and the suburbs – into the contemporary construct of separated patches, dividing the postindustrial city (Florida & Adler, 2018). The structure of the separated patches yields a construct that makes it necessary to examine the morphology of separation.

The spatial polarization of wealth and poverty in big cities is evident along the years. A neighborhood typology that showed neighborhood transitions and restructuring across three decades, 1980-2000, was explained by the socioeconomic condition. The five neighborhood types were clustered to describe the "shifting sociodemographic geographies of rapidly growing American metropolitan areas emerging as nodes in large-scale New Metropolises and megapolitan regions" (Foote & Walter, 2017, 1225). However, the spatial structure that explains such trajectories of mobility and stability is yet to be revealed.

Spatial clustering of neighborhoods in the 50 largest Metropolitan Statistical Areas (MSAs) in the United States, from 1990–2010, revealed the "increasingly fragmented sociospatial landscape" in urban America (Delmelle, 2019, 12). Los Angeles was the most fragmented of all 50 cities. The neighborhoods were classified into nine types according to their socioeconomic, racial and housing characteristics, and these types were the explanation for the spatial structure; comparing spatial clusters of wealth and poverty in the largest cities (e.g., Chicago, Los Angeles, New

York) and across the country where "spatial clusters of high-poverty black neighborhoods remained the most persistent through time, compared to all other neighborhood types" (Delmelle, 2019, 12). Thus, the spatial dimension of socioeconomic divides is recognized. Moreover, of all 50 cities, Los Angeles has the most fragmented spatial structure of wealth and poverty. This finding suggests a spatial explanation. However, the organizing rules that governed the processes were not identified; rather, the patterns of fragmentation and of settlement in cities and metropolis were described as chaotic and random.

To summarize the above sections:

- The first urban models assumed homogeneous city quarters – perhaps gradually declining in homogeneity: the radial pattern of concentric zones; the sectorial pattern of neighborhoods alongside employment zone; and the pattern of multiple nuclei for different functions.
- The following phases indicate increased heterogeneity – suburbanization and the decay of city core, and subsequently the "great Inversion" to the inner city (Ehrenhalt, 2012), constructing the patchwork metropolis (Florida & Adler, 2018).
- The contemporary postindustrial city is divided, but how? What are the nature and scale of spatial separation and dissimilarity?

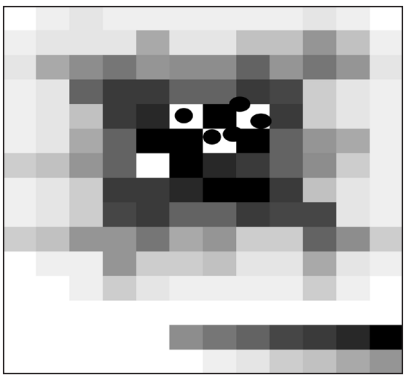

**Figure 1:** Chaotic and fragmented: Spatial structure of wealth and poverty

Note: A schematic representation of extreme wealth (dark) and poverty (bright) levels in close proximity (in the middle of Figure 1), and smaller gaps, in lower socioeconomic levels and lower entropy, towards the periphery

The model proposed in this paper expects higher disparities in richer cities. Figure 1 illustrates the spatial structure of wealth and poverty in cities, assuming a more chaotic, random and fragmented form of extreme wealth and poverty levels in close proximity (in the middle). The socioeconomic levels are slowly decreasing towards the periphery, and the gaps are gradually flattening into moderate and smaller gaps that express lower entropy, compared to high entropy (less informative value) in

the most fragmented spatial structure in the middle. Before theoretically explaining this spatial organization, and proposing possible conceptualization and measures for displacement as evident in big cities, it should be supported empirically.

As expected, wider income inequalities in dense urban areas, and lower social mobility in the longer term, are reported in recent studies (World Bank, 2020a; 2020b; 2021). Simulations developed for the "emerging global profile of the new poor" in various countries confirm that a "large share of the new poor will be urban" (World Bank, 2021, 33), and that the "new poor tend to be more urban than the chronically poor" (p. 37). Compared to chronic rural poverty, the Covid-19 crisis revealed the distinctive urban vulnerability.

Phone surveys and rapid monitoring on the impact of Covid-19 on households show the sharp decline in welfare, income and employment, among "people who were already poor" while impoverishing those who work in construction, manufacturing, wholesale and retail trade, and informal services. Higher rates of urban respondents reported they have lost employment, compared to rural respondents. Vulnerability increases with lower education levels, e.g., those who work in industry and the services sector, and most vulnerable are informal workers, migrants and refugees who often live in congested informal settlements with inadequate access to health care (World Bank, 2021).

In addition, disparity differs across high- and low-income economies, as expected. According to the World Bank, in high-income economies live 37 percent of urban residents that belong to the bottom 40, a larger share compared to 18 percent of urban residents in low-income economies. Moreover, "all regions share these characteristics. From Sub-Saharan Africa to Europe and Central Asia, children, adults with less schooling, and the rural population are more likely to be in the bottom 40, indicating that these patterns are robust relative to geographic conditions and economy-specific income levels" (World Bank, 2021, 123).

Previous OECD studies have also found urbanization to drive spatial inequality, with the world's largest cities as the most unequal (OECD, 2016; 2018). The cumulative findings depict cities as "inequality traps" and the richer cities as more spatially segregated compared to inequality at country level.

Figure 2 summarisiez recent data in reports and databases to present the strengthened connection between city size and higher economic growth and income level, and at the same time, also higher inequality, segregation – that represent income disparity and social polarization – and the probability to become poor. "Urban areas" tend to extremes (e.g., the Covid-19 new poor; the concentration of wealth in households in apartment buildings), compared to the *chronic poverty* in "Rural areas", and as opposed to a relatively moderate inequality in "Small towns". Larger cities tend to exceed national levels of growth and of average income and inequality – while smaller cities are more likely to shrink – and competitive economies differ from social-democratic economies that restrain disparities.

While redefining functional urban areas (FUA) and metropolitan areas, and witnessing the sharp segregation in city centers, residential choices of immigrants account for an additional set of bounding patterns. Immigrants from distant countries are more segregated than immigrants from neighboring countries, and more likely to be segregated in larger immigrant enclaves. Social disparities are revealed also through slower recovery from crises, e.g., after the economic crisis of 2008 and today after almost a year of Covid-19 slowdown. The economic growth of strong groups is detached from the decline of the rest (OECD, 2021a; 2021b).

The schematic representation in Figure 2 depicts some of the main findings regarding higher inequality, income and segregation in larger cities.

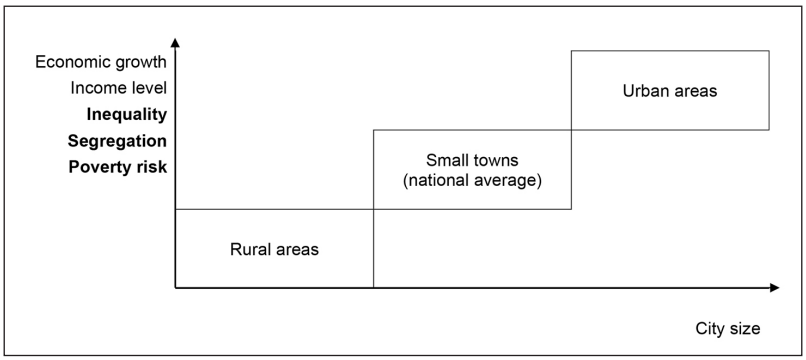


**Figure 2.** Economic growth, income level, inequality, segregation and poverty risk increase with city size: larger cities tend to exceed national average levels; while smaller cities are more likely to shrink.

The spatial concentration of innovative activity has long been studied in the context of agglomeration, economic performance and growth. Economists have established the connections between population and economic activity that is spatially concentrated, and innovation. They show that innovation is more spatially concentrated than manufacturing (Carlino & Kerr, 2015; Glaeser et al., 2015). Size and industrial diversity are among the factors that link agglomeration and innovation (e.g., Bettencourt et al., 2007; Bettencourt, 2013).

What explains the importance of *location* to clustering innovative activity? While industrial activity depends on externalities in the production of goods and services, innovative activity is clustered through mechanisms of sharing and matching. Knowledge spillovers play key role of in local areas. Carlino & Kerr (2015) review models developed in endogenous growth theory and theoretical literature on urban agglomeration economies, to explain the impact of location on innovative activity, and describe global factors that link innovation clusters together as well as the local advantage of "unique culture and intuitions" of an area (Carlino & Kerr, 2015, 2).

A morphological analysis is needed to methodologically assess the processes we see in the rich centers and the weak peripheries of global cities.

### *Gentrification Patterns vs. Displacement Disorder*

Recent decades made gentrification apparent across cities (Omer & Benenson, 2002). The 80's gave rise to the accommodation of the creative class in old communities (Florida, 2003). The internal migration, increasingly prevalent in large cities where housing costs are high, was criticized for the violation of the social fabric by newcomers, and the breach of higher cost of living in low-income neighborhoods. However, gentrification is changing its face (Venerandi et al., 2017; Zuk et al., 2015).

In recent years gentrification is gradually turning into displacement, a new form of spatial polarization. The rather organic process of urban renewal, initiated by individuals who choose to live in affordable neighborhoods, is transformed into displacement and residential segregation by real estate investors that initiate and organize financial projects for new housing but do not necessarily intend to make a home. The literature on gentrification – and later, urban displacement – tracks the changing inflows and outflows between neighborhoods, and the trajectories of social and residential mobility.

A morphological analysis made by Venerandi et al. (2017) in five neighborhoods in London had established the validity of urban morphology, termed *morphometric*, in relation to gentrification in the studied neighborhoods. In addition to morphological analysis, Venerandi et al. (2017) recognize the motives of collective action that drive gentrification. The effects of social and cultural changes are essential in the analysis of a typical urban form. Venerandi et al. (2017) identify the role of the physical fabric with eight measures that create an index for urban fabric. Linear regression analysis is applied on measures from all five neighborhoods to conclude that gentrified areas are "found to sit between urban main streets, which constitute their boundaries" and that "local businesses (cafes, newsagents, groceries), which tend to be present at the intersections with the highly central streets […] serve the inner residential clusters with local services and accessible routes positioned frequently (200–250 m). The prevailing urban type in all five cases is consistently characterized by low/medium rise, traditional perimeter blocks" (pp. 1070-1071). Streets width and building density are main features that portray the neighborhoods and the main streets form the edge of the urban areas that are defined as the gentrified neighborhoods. The analysis explains both the separating role of the wider streets that form urban edges (Venerandi et al., 2014) as well as the liveability (Venerandi, 2017) of the inner gentrified area. In other words, the form of gentrification is a form of homogenous areas, of social clusters that are interconnected within, and surrounded by main streets that "provide links to public transport, retail and other important nonresidential uses at the urban scale which are at walking distance" (p. 1070), thus, integrating rather than differentiating edges.

Residential polarization vs. integration is not only an economic question but also a matter of place making and the livability of public spaces, of possible routes in the city and navigation to points of interest, speed of motorized and unmotorized vehicles, and walkability. But beyond general and sometimes a rather nostalgic description, as Batty (2018) asserts, what is a proper configuration of land and resources?

If structure affects function, how should planning promote social welfare and economic development? Although inequalities exist "within the spatial structure of cities", claims Batty (2018, 216), "it is hard to unravel the processes that lead to such differences simply from patterns – forms and functions – that we have focused upon in this book. In short, we must admit that there is little we have said here that dwells on how such income and other inequalities emerge". Studies that do incorporate spatial methods may elaborate on the physical measures and structure (e.g., dissimilarity index, connectivity, etc.) but often neglect the landscape, street patterns, building facades and heights, and vice versa. The spatial structure of the city has an actual effect in several ways. Studies that focus on socioeconomic effects may describe the physical structure of the studied areas but are less likely to apply measurements of the physical structure.

As mentioned before, a growing body of literature describes the spatial structure of poverty and race in socioeconomic terms. What are the spatial measures that would identify them? Reis et al. (2016) reviewed the wide variety of metrics for urban growth and shrinkage, and emphasized the need to create a multidimensional indicator for the physical dimension of urban areas, "perhaps with the inclusion of socioeconomic and demographic variables as well" (p. 265). Residential segregation is often described in terms of geographic areas, locations, size, arrangement and other characteristics of the built environment.

*Morphology of Separation*

To understand the spatial dimension of socioeconomic divides, longitudinal analyses could identify structures that encourage integration and generation of the social fabric; structures that attenuate segregation between neighborhoods and streets under excessive development; and structures that force separation in a harmful way, mainly between displaced areas. Complementary to socioeconomic measures, spatial measures stipulate the mobility of human agents; whether the structures in concern limit function, liberate, determine, regulate, etc.

Oliveira (2016; 2019) addresses the contributions of urban morphology to cities in history and reviews the different approaches and dimensions in the study of urban form, a research area that emerged in the turning to the twentieth century (Oliveira & Pinho, 2010; Oliveira, 2016). The economic, environmental, and social impact created by the physical elements of urban form is presented. The influence on the social dimension of our life in cities, and especially on social justice and social deprivation, is shown by Laura Vaughan who studied urban segregation in different cities, applying the tools and paradigm of space syntax (Vaughan et al., 2005; Vaughan, 2007; Vaughan & Arbaci, 2011). Omer & Goldblatt (2012) presented

similar results in Tel Aviv and Roberto & Hwang (2017) further emphasized the segregating impact of physical boundaries. The role played by the spatial structure as a *barrier* to residential integration is significant compared to the influences of spatial proximity and connectivity (Roberto, 2018).

Physical barriers, more than distance or connectivity (distance and connectivity can be referred to as perceived usefulness and perceived ease of mobility, respectively), are therefore socioeconomic forces. To further emphasize the strength of spatial barriers, Omer & Goldblatt (2012) show that *separation measures*, rather than the vastly conventional measures of centrality, are highly explanatory with regard to socioeconomic differentiation.

As opposed to networks research, and especially space syntax that since its inception has emphasized measures of centrality, Omer & Goldblatt's (2012) findings draw attention to the potency of separability. The impact of roads that split up urban regions and neighborhoods exceeds the incorporating contribution of pavements and paths for pedestrians. In addition to the practical contribution of Omer & Goldblatt's (2012) findings to urban planning, with regard to streets width and other components of separability, they propose a theoretical contribution that sheds new light on centrality and underline a new interpretation for (dis)connectivity.

How do spatial separation and dissimilarity affect the extent of socioeconomic differentiation?

*Spatial Cognition*

The dominance of visual perception, and the role of a broad field of view, are central to the interpretation of topological information. The visual elements identified are dissimilarity of spatial integration, in addition to spatial separation between areas. Omer & Goldblatt (2012) evaluated the effects of spatial relations on residential differentiation between adjacent neighborhoods, i.e., the scale is of walking distance.

The pedestrian viewpoint is formalized in theories and paradigms such as embodied cognition, space syntax, affordance, and more. The spatial configuration of urban environments is immanently related to sensation and perception, cognitive representations, and embodied behaviors. Therefore, the assumption is that spatial separation is a factor that shapes socioeconomic patterns in the course of time. Not only connectivity and centrality of road network – but physical barriers such as wide roads or topological elevations that block the field of view. The physical creation of vision and walkability, and the adaptation to living and behaving in an urban habitat, is a context that suits the analysis of topological distance and other dimensions for proximity and sight – a consequence of adjusting to earth and in nature. However, when the home, a place of living, is the artifact in question, the accelerated evolution of real estate investments and financialization further distort a rather physically-based process of decision makers that evaluate and decide where to walk, navigate, reside and live. This process is detached from a closer circle of entrepreneurs and residents to a wider circle. While scaling, in order to keep the

local view, the pedestrian view, a measure that must be planned with cautious is the width of the road; the longer the road, the more dividing is the width. The price (or punishment) for faster connections with far places is the distance from near places (Purian et al., 2019).

To summarize the spatial constellation of social segregation (the *local* factors; physical structure):

Connectivity by walkability: Main roads separating regions and neighbourhoods vs. the incorporating contribution of pavements and paths for pedestrians. Preliminary results affirm the persistency of spatial segregation and displacement in Tel Aviv over the last decades.

Connectivity by topology: Movement models can expand to several different types of stimuli and perceptual modalities.

Considering the dominance of visual perception, what is the role of the field of view in the interpretation of topological information? How does vision, being receptive to topology, affect the perception of places and spaces? While the social impact of the pedestrian paths network is relatively acknowledged, the role of topology and embodiment in this context is yet to be reasoned and validated.

Urban morphology that frames the visible landscape to passersby holds a social impact, as it affects their perception of places and spaces. In the same respect, what are the influences of technology on behaviors?

*Global Cities: Habitat and Artifact*

The morphology of street networks affects the functioning of agents and is shaped by them. Highways and building facades deploy isolation and separation. So is technology in the rapidly growing vibrant cities that are hubs for national economies. Global cities (Deruytter & Derudder, 2019; GaWC, 2010; Kipnis, 2012) attract global investments and technological innovation (Arribas-Bel et al., 2013; GFCI, 2018; Sassen, 2009). The many characteristics of global cities, however, also include the negative effect of socioeconomic partitioning (Duranton & Puga, 2020; OECD, 2016; 2018), shaping a spatial constellation that further increases the persistency of separability, segregation and displacement. In Tel Aviv, for example, since its establishment and throughout most of its history, the southern and the northern parts were characterized as economic and cultural opposites (Aleksandrowicz et al., 2017; Omer, 2018). However, although the sociospatial axis between north and south is prevalent in research (Cohen & Margalit, 2015; Modai-Snir & van Ham, 2017; 2018), it seems that the conventional perception of two vertical halves – rich north and poor south – is being rearranging into horizontally condensed loci of wealth and poverty.

Horizontal axes emerge and divide urban areas: from new and renewed neighborhoods along the seashore on the west; to commercial areas that displaced older neighborhoods adjacent to the Ayalon highway on the farther east. As happens in other world capitals, a new form of gentrification spreads disparities in the city (OECD, 2016; 2018). Intrusive planning and building projects displaced older or

less-developed places in the city, and a building boom of luxury towers explicitly changed the urban landscape, polarizing vicinities.

A preliminary analysis of changes in socioeconomic areas showed mixed results, applying "space syntax methodology using axial lines" (Omer & Goldblatt, 2012, 179), to ensure consistency and replicability with the same morphological methods. A possible conclusion is that more dedicated and fine measures should adapt to the resolution of distinct spaces and focus on single buildings and isolated high-rise urban habitats.

While previous periods had witnessed the diffusion of wealth and economic mobility between adjacent neighborhoods and in the suburbs (patterns of socio-economic integration), urban scaling in size and in speed, and the increased coordination between urban hubs worldwide, created a sequence of global identified vertices. Such hypothesis is consistent with the conception of the rural-urban gaps, the inner-city and suburbs, the trajectories of economic mobility between neighborhoods, but then, under the pressure of globalization and accelerating economic forces, fueled by digital platforms, a pattern of irregular and unanticipated polarization appears in the city.

While gentrification had often followed urban grid conditions (Howsley, 2003) in a process that now can be considered natural with city growth, the new pattern of differentiating by displacement raises a threat of unanticipated polarization within the streets, and between buildings and amenities. The morphological shift is accompanied by a socio-technical shift. As opposed to the gradual rejuvenation in old communities that host newcomers, real estate investments are orchestrating displacement in coordination with the local and the central government, with suppliers and contractors, in fast and efficient actions towards high-scale profit-driven construction projects. In the context of Venerandi et al. (2017), personal housing decisions made by families and individuals did institute gentrification, however, individual choice and degrees of freedom are reduced when facing a multi-layered system of urban planning and building.

Residential differentiation has long been recognized between adjacent neighborhoods. If residential differentiation depends on the spatial structure of the physical city, what are the spatial measures that identify and reveal the extent of socioeconomic polarization? Figure 4 demonstrates the need in fine measures to capture the scatter geography of structure and function (centrality and connectedness vs. traffic load in Tel Aviv). Although this paper does not aim at proposing such measures, both street networks and the spatial complexity are operationalized for that purpose, as suggested by Boeing (2017; 2018; 2019) that addresses the need to analyze complex street networks, including spatial information and legibility of urban form and design.

To summarize the morphological part (Benenson & Torrens, 2004; Omer, 2018), streets and their morphological patterns have a crucial role in the complex societal and economic change of neighborhoods (Omer & Goldblatt, 2012; Roberto &

Hwang, 2017; Roberto, 2018; Vaughan et al., 2005; Vaughan, 2007; Vaughan & Arbaci, 2011; Venerandi et al., 2014; Venerandi et al., 2017; Vlachou & Vaughan, 2015).

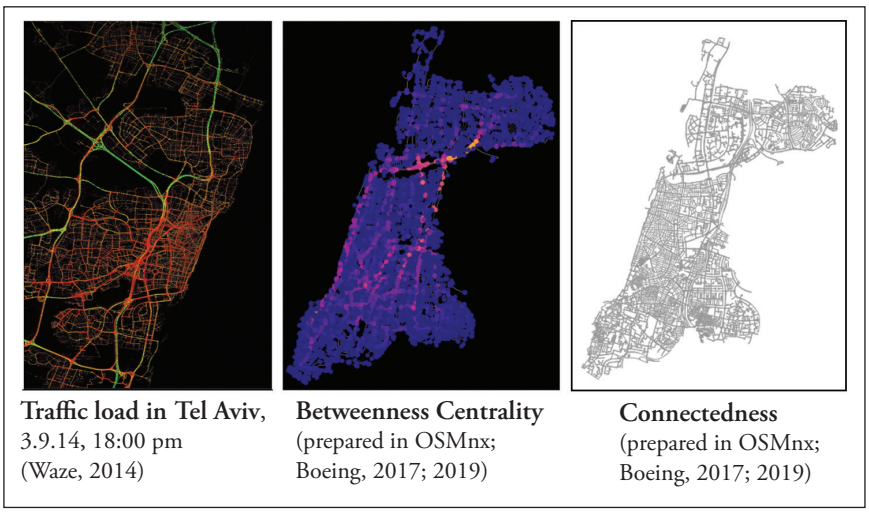


**Figure 3:** Connectedness, betweenness centrality and traffic load in Tel Aviv

Residential differentiation will likely change along with urban expansion, socio-economic progress, and human development achievements. Proper adjustment and configuration of land and resources can promote sustainable urban planning and harmonious development. As proposed by Oliveira (2019), in addition to a dynamic perspective that explains the involvement of different processes and agents in the physical transformation of cities over time, a prescription is also offered by urban morphology to design current structures, either change or conserve. The prescription must be simple, embedded and intuitive. The local constellation that shapes gentrified cities is a matter of separation. Wherever disconnected, disparities take off.

To what extent can urban form revoke the restrictive and alienating conditions of the status quo (Purian, 2015)? The attempt to predict what will emerge out of the interaction between the diverse agents and processes is almost impossible (Partanen, 2020; Purian & Partanen, 2020). Even more challenging is the need to plan a city and try to materialize growth patterns and interrelated factors that obtain prosperity.

Virtual Reality (VR) and 3D modelling can provide a virtual environment that makes it possible for planners to capture multi-modal perceptions and embodiment (Portugali, 2006). The new planning apparatus, sensitive to topological features, may integrate urban 3D simulations with data from multiple sources, e.g., a multi-layered GIS-based system (Purian, Ahituv & Ashkenazy, 2012), to better

construct the various planning aspects (spatial perception, transportation, land use, and more).

Yet, the theoretical prescriptions and the sophisticated tools apparently fail to change the course of transition we face (Purian et al., 2019; Rauwset al., 2020). What makes a historical continuum of separation, from gentrification to displacement, rather than a succeeding phase of socioeconomic integration and homogeneity?

The next assumption would be that the evolution from homogeneous zones to gentrification and displacement indicates the influence of hidden factors that drive the growth of discrete nuclei in the city: originating new pockets of wealth – perhaps even faster than the inertial speed of the city (Bettencourt, 2013), while physical constraints delimit intrinsic consistencies of poverty.

### *Elevations all the Way Up: Vertices Isolated with Technology and Information*

The extreme segregation that exceeds socioeconomic integration over time leads to the establishment of two layers of reference, the local and the global. Tel Aviv illustrates the explanatory power of separation measures compared to centrality (Omer & Goldblatt, 2012), one of the most acknowledged factors in urban studies and networks theories. This is the *local* description that captures the spatial configuration of social segregation. In addition, *global* forces are assumed to induce displacement in cities. Tel Aviv provides a description on that perspective as well (Purian et al., 2019).

What is the spatial manifestation of the propensity to move fast in the global cities? Assuming there are fast lanes that not only deepen urban inequality but create intangible barriers between those who have and those who do not have – how do such invisible routes imprint physical barriers in the city? Beyond the well-established study of social integration between socio-economic areas in the city, should we expect a new expression of disparities in the city as the speed affects the separation much as liquid particles.

*Hillier: Innovation vs. Stability (global flows of people and money)*

Laying on Hillier & Netto (2002), new technologies do "change the spatial basis of society", and "have an impact on society itself". The challenging questions are *how* and *why*? Hillier (2016) pointed at the dual form of the generic city that creates and reflects two urban grids. The sociocultural stability in the background grid and the morphogenesis of social and spatial networks in the foreground grid are structured by the city and should serve the city. However, in this paper the claim is that the coexistence of the interlocking grids is disrupted: sociocultural factors in the background and microeconomics in the foreground create and reflect the transformation in communication – and communication is the *raison d'être* (Mingers & Walsham, 2010), the constituent of urban form and function. As emphasized also by Hillier

(2016, 199), "cities exist to create contact", and his intention is to define "two very specific kinds of contact".

The most basic terms in which he describes and explains the behavior of the system – the speed, density, redundancy, integration, distance, movement types and coefficients – are changing in the new ecosystem of applications. Urban spaces cannot be considered the same way when residence and social networks, local and global spatial connections, are generated, maintained and behave according to new information and communication technologies. Hillier's (2016) social and spatial networks model, therefore, can be expanded to a new model where the *smart* city delineates new *contact* channels, speed and locations.

If the coexistence of "microeconomic morphogenesis and sociocultural stability is what the city is for", then a new account of morphogenesis, sociocultural factors and (in)stability currently structures and serves urban digital life. And while Hillier concludes that "Taken as a whole, the spatial nature of the city supports the development of both social stability and morphogenesis through social networks" (2016, 211), this paper argues that "one of the fundamental effects of the city", again in Hillier words, "to create non-local connections, and so to overcome distance", is the current transformative effect that connects the far in *dense* groups through local to global spatial connections that *now* emerge, but socially excludes the dissimilar close ones.

New technologies that set certain rules of moving in space are shaping not only spatial behaviors (e.g., navigation or shared mobility) but may also affect social integration and social cohesion – much as accessible roads enhance social integration. The claim is that personalized services divide passengers rather than connect in collective services – much as, e.g., public transportation or community applications that care for collaboration. Highways that connect between more distant locations may undermine the social fabric in near places; and so are frequent flights, strongly coupling technological and economic forces to instigate a dividing flow, underneath the physical observable layers.

In other words, Hillier's assumptions are relevant for a *Gentrification* scenario, but should adapt to the *Displacement* scenario, "where the form and nature of society is given by the devices through which society overcomes space to inter-relate a region of separate spatial groups", as Hillier well describes (2016, 211). The same rules that apply to pre-urban societies apply also today. While economic success is indeed associated with "non-local rather than local measures", and indeed reflects "how cities work economically to develop and innovate, rather than how they work to create social stability", I will argue that today, in addition to innovation and economic success, cities are affected financially and the extreme gap in profit from work and from investments and properties resonate and outline the conceptualization and measures for displacement.

Urban networks have been active since the birth of cities and evolved with trade. Today movements of capital and people are happening in unprecedented pace.

Global citizens, on the high end of the socio-economic urban ladder, are the cosmopolitan habitants of global cities. Even when adapting to local cultures they are consolidating leveraged routes by affiliations to global companies and flows, and by properties that characterize the lifestyle of the relocating families, e.g., their children's participation in international education systems. On the low end of the ladder are migrant workers, affected by economic distress, wars, global warming and growing shortage in food and resources in their countries of origin (Vlachou & Vaughan, 2015). Global citizens and work immigrants embody two extremes – of wealth and of insufficiency.

The world's major urban hubs create the spinal cord of the global network of global cities. The "spatialization of the a-spatial and non-local knowledge groupings" (Hillier, 2016, 210) is a tangle of corporates' HQs, originated in similar competitive business environments, and globally distributed. The global network is therefore dense, fast, determined, forced to grow, enabling routing on fast-pace tracks, and is likely to generate unexpected fluctuations, both in terms of financial volatility (e.g., major crises in a more globalized economy, and weaknesses in banking regulation and supervision) and in physical terms of morphological irregularity (e.g., random forms of separation in the streets). Metaphorically, the topological elevations of high-rises reflect the high yields and financial volumes generated by those portrayed as global citizens, that keep close contact in fast lanes but class distance in close proximity.

*Lynch: Pedestrian's Time and Distance (dividing flows of technology)*

When Kevin Lynch wrote about time ("What time is this place?" Lynch, 1972) he identified the rhythms of places. The patterns of movement can be perceived as the polyphony of vehicles and other mobility measures and spatial behaviors (such patterns are identified in music in the general sense of tempo, tension or dynamics when playing a piano). Lynch compares between similar areas in the city: "A city district in its simplest sense is an area of homogeneous character, recognized by dues which are continuous throughout the district and discontinuous elsewhere" (Lynch, 1960,). The "homogeneous character" of city districts is recognized by continuous spatial characteristics, building type, style or topography. As proposed by Lynch: "It may be a typical building feature, like the white stoops of Baltimore. It may be a continuity of color, texture, or material, of floor surface" (Lynch, 1972, 103). Lynch's sense of time is an intimate rhythm, not subordinated to the external regime of objectivity. His embodiment obeys to inner subjectivity in a continuum of the mind, the body, and the physical environment in our material world. The innate intent affects our experience in cities, both the effect and affect, actions and reactions, impression and expression.

When talking about complexity and smart cities, a dual perspective should be considered, the physical and the digital, taking into account the fast growth of urban information networks, and combining the informational framework for navigation and way finding in all levels, locally and globally. The desire to organize the

city by separating urban functions – avoiding mixed land use of residential and commercial areas and planning straight streets – characterized a period of more than half a century. Time spent on roads rather than in places on the way is time alienating places, distancing the near and favors the fast. Moreover, being fast and efficient depends on routines that decrease flexibility and ability to make different choices. The smarter the city – in terms of increased dependency on automated processes and service providers – the greater is the need in regulation and policy making to control the accelerating forces and to empower the citizens; at least to increase their sense of control. Based on Lynch's observations, how would *irregular* street patterns affect the pace in such streets, compared to a pattern of urban *grid* that injects order into suburbs, or to the earlier pattern of organic *sprawl*? While pleasant urban environments are those least ordered, displacement is a polarizing patchwork, deficient in the organic qualities of emergence and rejuvenation, such as that gentrification may display in old communities.

Rephrasing Lynch's (1981) "A theory of good city form" – a theory of *smart* city form – should emphasize the order of separation, and how inevitable is the form of segregation when using the technological aids that change behaviors and fragmentize groups in the society. Attitudes and social norms are changing, and so are the perception of time and place, of contact with others, and of our own identities. Subjectivity faces a realm of quantified selves, optimized personalized services, and collaborative filtering in recommender systems that further improves useful recommendations in our daily life, but at the same time embraces us with those who are like us and keep away the dissimilar. Alienating processes are autonomously reproduced in the routine cycle of weights calculations. The physical impact can be seen in our spatial behavior, consumption, leisure and recreation, and then in the social capital and our relationships and networks. The systems that allow super-users to exploit and appropriate hyper-functionality are accessible to all users. Bifurcation, however, is unavoidable. Users from less advantaged environments may not have the qualifications and the acquaintance with the systems; usage patterns may be less selective by less sophisticated users, and the acceptance of specific systemic advantages may also discriminate those anxious users who avoid innovation compared to the digitally literate who would utilize place-based on-demand services, from navigation, car sharing and ride sharing to shared workspaces and co-living. Not only career paths, personal and professional development can be affected by the decisions that recommender systems are paving; the economic activity is affected by the arrival or disappearance of consumers, with recommender systems capable at altering their preferences, tracking them into routes and city zones. With dozens recommender systems that are embedded in our apps and devices, time is accelerating, and places are at distance. The form of roads and buildings is therefore a basic layer on which the city changes in structure and in function.

Figures in Lynch (1960; 1981) tell much about city form and its elements. Considering an updated version for the concept of Time-Space, elevations in the

topological map should be transformed into representations of faster financial growth and consolidation of leveraged routes, i.e., height differences that express not only higher income but qualitatively different capacity to path through vertices in the network of global cities. The accelerating pace of digitally literate citizens in global cities is a feature of social divide, materialized in the physical structure of the city through luxury residential complexes, distinct and leveraged. This perspective makes the digital artifact an integral part of the city. Another dimension of the sociotechnical dynamics is rooted in the pedestrian perspective – the individual level of wayfinding, commuting, navigating. Increased awareness to the time difference from the starting point to the destination, when using navigation applications and shared mobility services, eliminates the focus on the places in between, and reframes spatial and temporal perceptions. The way is just a space to cross, placeless and meaningless, except for its meaning in time. Endless construction projects in city centers worldwide are therefore need of the hour.

Lynch (1981) distinguished between the physical and the digital in his own way, describing the presence of "persons acting and the physical facilities that support that action" (p. 351), subdividing and elaborating on the various activities possible. The many actions and things in the city consume and produce energy, and materialize information, either transmitting data via ICT or storing and communicating via books, speech, and credit accounts (Lynch, 1981, 353). New web architectures, virtualization, and the ability to read and write instantaneously from distributed databases made it possible to further brand and tag objects and places, deliver photos and videos worldwide and increase online actions and interactions. "Individual entities are used as disposable instantiations of universals", claims Floridi (2002, 131), "and thus can swiftly weave different lives, which do not necessarily merge". Members of online communities and social networks play the role of data subjects that refine purchase and re-purchase choices, or radicalize the public discourse between polarized communities and social groups (Purian et al., 2020). The purpose of this section is not (only) to criticize consumerism, but to emphasize the incoherence of *presence* in different *locations*. If there is no time, there is no place.

Communities today produce and consume narratives online. As has been done throughout the ages, people create narratives – concepts that culture and language afford to recognize and share – to give meaning to reality. Technology makes the process and the "precious semantic resources needed to making sense of the world" (Floridi, 2002, 130) increasingly easy. Moreover, narratives created in the virtual space through recommender systems are shared by communities of users that produce and consume data for further improved collaborative filtering algorithms. The participation of others is enhanced with ICT that enable further "de-limitation of culture", as put by Floridi (2002, 130). However, new limits bound the participation in processes that construct, refine and transmit our private reflections into beliefs, identities, values and shared ethos. This leads to the rather tangible, biological analogy of urban dynamics.

*Prigogine: Scaling Speed and Fluctuations (local flows)*

Time gains tangible presence through the description of places. Prigogine & Stengers (1984, 17) illustrated, in one sentence, how space acquires a temporal dimension: "Consider a landscape and its evolution: villages grow, bridges and roads connect different regions and transform them". They emphasize that, while the "local time associated with each observer" depends, on the local level, on "the 'communication' between observers", there is also a global level, e.g., age is not located in a specific body part.

The temporal dimension is significant in the fast-paced urban environment. Prigogine & Stengers (1984) compared self-aggregation at high and low densities of insect population. The experiments they cite show not only the *speed* of aggregation processes, but also the *effectiveness* of the cluster, how tight and confined it is. The experiments illustrate the role of fluctuations in insect populations, slime molds and the construction of a termite's nest. The principles and patterns recognized biologically provide a reasonable analogy for the fluctuation of agents in a city and for the identification of spatial evolution. The rapid growth of the cluster precedes the "formation of a new structure", claim Prigogine & Stengers (1984, 181). They connected fluctuations with *structural stability* and emphasized the *amplification* of fluctuations.

In the crowded environment, the fast-paced cluster gains central location, much as the fluctuation shown in the patchwork metropolis (Florida & Adler, 2018), created by an inward shift of wealth from the suburbs (Ehrenhalt, 2012) into clusters in the high-density center. Similar aggregation behaviors were observed in the experiments described by Deneubourg: "as they gather in a cluster, the larvae contribute to enhance the attractiveness of the corresponding region. The higher the local density of larvae in the region, the stronger the gradient and the more intense the tendency to move toward the crowded point" (Prigogine & Stengers, 1984, 181).

Effectiveness means larger cluster size; does it specify who can join? Population density determines the number of participants that join and that will "finally be part of the cluster" (p. 181). Large number does not necessarily imply inclusiveness. Effectiveness can be analogues to the building boom of luxury towers (mentioned above, in Tel Aviv) as well as to affordable housing, both achieving high numbers of residents, but aim at different populations; distinctive luxury buildings that count their "similar" vs. inclusive community buildings that manifest pluralistic values (the idealized unifying bricolage of diverse neighborhoods, i.e., multi-cluster solution).Table 1 summarizes the findings.

In dense environments, as we see in our cities in recent years, clusters of condensed wealth rise in inflexible spaces and tighten up their boundaries to include a homogeneous population. Deneubourg's description anticipates the structure of separated patches, as emerged in cities (Florida & Adler, 2018) and identifies this construct of separation in terms of "homogeneous initial conditions" (Prigogine & Stengers, 1984, 183). Indeed, new clusters may appear and develop "new types of

structures" based on intermediate values; however, to actually appear and coexist, a multi-cluster structure depends on heterogenic values, i.e. divide to create.

**Table 1:** The solutions that appear in different systems and regions.

| | **High density** | **Low density** |
|---|---|---|
| Speed | Cluster appears and rapidly grows | No stable cluster appears |
| Location of emergence | At the center of the setup | |
| Effectiveness | Higher numbers join the cluster | |

Are the clusters inclusive or do they attract, as happens in cities, "people like them"? The competition favors the conservative option. In phase change, the "temperature and pressure reach a point where the liquid state become stable […]". Moreover, they state, "the faster communication takes place within a system, the greater the percentage of unsuccessful fluctuations and thus the more stable the system. This critical-size aspect of the problem means that in such situations the 'outside world,' the environment of the fluctuating region, always tends to damp fluctuations" (p. 187). Effective communication between the two, the "fluctuating region" and the "outside world", will destroy or amplify these. Prigogine & Stengers (1984) describe this tension in biological and chemical systems in terms of "the competition between the system's 'integrative power' and the chemical mechanisms amplifying the fluctuation" (p. 188). The very same principles of fluctuations and structures can be adapted to the dynamics of cities that experience bifurcation in planning, amplified by social and economic preferences, in the absence of an "integrative power". With the decline of the welfare state, and the proliferation of real estate acquisitions that manifest the power of new market players, economy imprints a physical trail across the city.

To summarise, Hillier's (2016) tension between innovation and stability, represented in two interlocking grids, helps to explain the global flows of people and money, while Prigogine & Stengers' (1984) emphasis on scale, speed and fluctuations complement the informational framework for local flows, and connect with Lynch's (1972) pedestrian perspective of time and place to show how dividing flows – driven by on-demand mobility services and collaborative filtering in recommender systems, with no "integrative power" – send the *way* to the background and bring *time* to the foreground, thus, dismiss the near places.

## CONCLUSION

The First Law of Geography, as stated by Waldo Tobler, asserts that "everything is related to everything else, but near things are more related than distant things" (Tobler, 1970). Today the ICT artifact imprints a physical trail across the city, and

favours a new version for Tobler's law. According to this version near things are more *separated* than distant things. Physical barriers that divide groups are not that illusive. The first parts of the paper emphasize the importance of *separation* measurements in urban morphology. Next, a rather high-level interpretation of the current state of affairs in cities – regulation regime, scaling and routines – is connected with the very tangible features of the built environment: spatial integration and social mobility on the one hand, and the efficiency, separation, high walls and segregations between socioeconomic clusters, on the other hand.

A new perspective on urban morphology, in the age of information acceleration, is presented in this study. The establishment of two layers of reference, the local and the global, provides a new perspective on the societal as well as the spatiotemporal dynamics in the city. In short, the global connectivity that globalization allows is outward-interconnecting but inward-disconnect.

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