

The Compact City and Contemporary Urbanization Processes: Discussing Alternative Interpretations of Urban Compactness

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Abstract

The Compact City is a paradigm that is widely promoted as a sustainable way of development. However, the desirability of urban compactness is frequently questioned in urban theory, and empirical research shows that the effects of compaction are highly ambiguous. Furthermore, contemporary urbanization processes fundamentally change the scales and complexities that urbanism has to deal with. Therefore, new interpretations of the Compact City are needed. This paper discusses alternative interpretations of urban compactness in order to initiate the exploration of design and planning principles that are geared to today's urban challenges, and thereby deepen insights into the links between the Compact City and urban morphology. The paper starts by outlining the current debate on the sustainability of compact urban form and giving a short overview of three theories that capture contemporary processes of urbanization - Planetary Urbanization, Mega-regionalization, and Peri-urbanization. This gives an impression of the phenomena to be considered. Subsequently, alternative interpretations of urban compactness are presented and discussed based on their relation to the urbanization processes presented beforehand. The chosen interpretations - compactness through autonomy; regional compactness; compactness of flows; and relational compactness - originate from existing theoretical literature. The review shows that except for regional compactness, each of the interpretations adequately responds to the theory on contemporary urbanization processes. A set of hypothetical diagrams that tries to translate the interpretations into empirical measures shows that each of them has the potential to point towards types of morphological analysis that go beyond the conventional focus of urban compactness on population and building densities. It is therefore concluded that if alternative interpretations of urban compactness are developed with consideration of urbanization theory, and they implement a variety of empirical measure, they can make valuable contributions to urban issues beyond the disciplinary limits of urban morphology.

Keyword: Compact City, Planetary Urbanization, Mega-regionalization, Peri-urbanization, Sustainable urban form

Introduction

The Compact City is an omnipresent paradigm in urban development. A majority of public institutions worldwide promote some form of compact development (OECD, 2012). It is a widespread assumption that high population densities, good accessibility of public transport, and mixed urban functions support sustainability (Bibri, 2020; Burton et al., 1996; OECD, 2018). However, the academic discussion on the Compact City is much more contested. Empirical research shows that while the economic effects of compact development are mostly positive, the social and environmental effects are rather ambiguous (OECD, 2018). Furthermore, the Compact City is increasingly criticized in urban theory as a paradigm that supports neoliberal agendas (Kjaeras, 2020), and for simply being an antidote to counteract urban sprawl (Rode, 2018). Hence, the enthusiasm for urban compaction in practice is not backed by academic research.

This fragile relation between the practice and theory of compactness is exacerbated by the increasing complexities that are posed by contemporary processes of urbanization. Increasingly dispersed and fragmented urban landscapes make conventional urban-rural distinctions hardly applicable anymore (Wandl et al., 2014), while urbanization itself is increasingly perceived as a process that cannot be captured through predefined spatial units (Brenner and Schmid, 2015). Against this context, the conventional conception of the Compact City poses a risk of oversimplification and abusive instrumentalization.

This paper aims to contribute to a critical and sophisticated understanding of the Compact City by testing its adaptability to contemporary urbanization processes. Instead of adding to the plethora of empirical research that assesses the effects of conventional features of compaction, it could be more fruitful to reconceptualize compaction itself. Therefore, the paper identifies alternative interpretations of urban compactness and discusses their potential to capture and respond to the issues arising from urbanization. The following section builds the foundation for this by further illustrating the debate on the sustainability of the Compact City and outlining three core theories of contemporary urbanization processes. The remainder of the paper then presents four alternative conceptions of compactness and discusses their potential application in the context of contemporary urbanization. Lastly, an attempt to translate the alternative conceptions into empirical measures is presented.

Background

The Compact City debate

Urban compactness became a popular development principle during the latter half of the 20th century. The original proposal for "Compact City" was a rather mathematical vision for a utopian city by Dantzig and Saaty (1973). Their spatial model is merely mentioned in urban theory, but their basic principles of density, accessibility, and multi-functionality decisively coin the definition of compactness until today. Furthermore, the high popularity of the Compact City towards the end of the century is related to the increasing popularity of sustainability during this time (cf. Burton et al., 1996) and the increasingly negative perception of urban sprawl (cf. Bruegmann, 2005). The Compact City imposed a clear tendency on the discussion between "centrists and decentrists" that characterized much of the 20th century, and became a leading paradigm in urban development (Breheny, 1996).

Despite its popularity, the sustainability of compact urban form is discussed extensively and inconclusively at least since the 1990s (Bibri, 2020; Neuman, 2005). Correlations between population density, commuting patterns, and energy consumption are discussed at length, but no generalizable consensus has been found yet (cf. Ewing and Hamidi, 2017; Kjaeras, 2020; Neuman, 2005; Newman and Kenworthy, 1989).

The OECD's (2018) review of more than 300 scientific studies and their insights on the effects of compact urban form provides some clarity on the shortcomings of existing research. Most notably, there is hardly any

research on the effects of mixed land-use, because most studies focus on the effects of economic density, typically measured through population density (OECD, 2018). Recent theory, however, shows that a more holistic understanding of compactness is needed. For instance, Westerink et al. (2013: 493) argue that "narrowing down the compact city idea to high density only is undesirable and does not do justice to the complexity of real-life cities". Accordingly, this paper aims to outline some directions for a more nuanced understanding of compactness that is better geared to respond to today's societal issues.¹ The following section gives an overview of what these issues might be.

Contemporary Urbanization Processes

There is, of course, an enormous body of theory trying to grasp contemporary urbanization. To keep it short, three theories are deemed most useful here to illustrate the broad scope of perceived processes: Planetary Urbanization, Mega-regionalization, and Peri-urbanization. At the risk of a disastrous oversimplification, the three theories are very shortly described hereafter.

Planetary Urbanization is most prominently articulated in the recent work of critical urban theorists (e.g., Brenner, 2014; Brenner and Schmid, 2015; Merrifield, 2013), who argue that urbanization has expanded far beyond the conventional city scale, as the causes and effects of urbanization appear on a planetary scale - "urbanisation is global and boundless" (Merrifield, 2013: 916). Brenner and Schmid (2015) argue that the ignorance of these multi-scalar impacts and the prescription of fixed scales and categorizations such as urban and rural support the continuous reproduction of social inequalities and environmental destruction.

Mega-regionalization is used here as an overarching term to describe concepts like megalopolis (Gottmann, 1957), global city-region (Scott, 2001), and megaregion (Florida et al., 2008). One commonality of these concepts is that they acknowledge the rising importance of networks of large cities and their hinterlands as "regional motors of the global economy" (Scott et al., 2001: 18). They thereby advance Global City theories (e.g., Friedmann, 1986; Sassen, 1991), showing that cities do not only exploit their position in the global economic network, but also exploit the benefits and resources of their immediate surroundings for economic expansion and increased competitiveness (Ross, 2009; Scott et al., 2001).

Similar to the first two theories, *Peri-urbanization* is based on the idea that urbanization processes have started to expand beyond traditional city limits. Additionally, Peri-urbanization makes the observation that some urban landscapes have a degree of dispersion and fragmentation with unique characteristics that cannot be described as urban, rural, or as a combination of the two anymore (Wandl et al., 2014). Numerous scholars have started to conceptualized these peri-urban areas in specific geographic contexts: the *Horizontal*

¹ There is some valuable research on the complexities of "shape compactness" (cf. Angel et al., 2018, 2010; Marshall et al., 2019), but these studies focus exclusively on physical urban form and barely link to broader questions of urban theory.

Metropolis (Viganò et al., 2018), the *Zwischenstadt* (Sieverts, 2003), and the *Desakota* (McGee, 2017; McGee et al., 1991) all argue for a more descriptive analysis of the extensive urban landscapes that arise from regional urbanization.

These short descriptions are not sufficient to grasp the complexity and richness of theories of contemporary urbanization. Nonetheless, they set the stage for the challenges that the Compact City needs to respond to. In the following presentation of alternative conceptions of urban compactness, more specific notions of the theories are mentioned occasionally to clarify some of the issues at hand.

Methodology

Four alternative conceptions of urban compactness are discussed hereafter. Each theme is presented based on the references that articulate it, and then critically discussed in the context of the before-mentioned urbanization processes. Eventually, some proposals for the translation of the theoretical conception into empirical measures are made. Hence, the paper presents an interpretive research design with a qualitative content analysis (Du Toit, 2015) that merges theory from urban morphology and urban studies.

Literature on the four approaches is rather sparse. Although more research into these topics can be found when looking beyond Compact City theory, or even beyond urban morphology, this paper mostly keeps the focus on literature that is clearly related to compact urban form. This helps to make a concise contribution to Compact City research, and simultaneously leaves some freedom to hypothesize on new morphological principles without the restraints of fixed empirical conventions.

Results - Four Alternative Conceptions of Urban Compactness

Regional Compactness

Simply speaking, regional compactness is an analytical approach that uses data for geographical areas that are larger than a city or district (e.g., Ewing and Hamidi, 2017; Koziatek and Dragičević, 2019). Different from this rather analytical interpretation, Thomas and Cousins (1996) discuss the possibility of complementing conventional *physical* compactness with some form of "virtual compactness" that combines local and regional compactness. Their explanation of what this actually means remains shallow, but they indicate that besides walkable, mixed-use districts, the regional composition of these districts should help to minimize travel demands. This might require some form of decentralized concentration that increases "the attractiveness and energy efficiency" (Thomas and Cousins, 1996: 52) of an urban landscape.

Regional compactness as an analytical and strategic concept has limited capacity to respond to contemporary urbanization challenges. It obviously acknowledges regionalization processes, but seems rather inflexible in its choice of scales. Both Thomas and Cousins (1996) and Koziatek and Dragičević (2019) mention the combination of local and regional factors without further specifying it or mentioning the importance of more

and larger scales that Planetary Urbanization emphasizes. Lastly, the focus on fixed urban units leaves little space for the blurred borders and fragmented conditions of peri-urban landscapes that often make it impossible to define any districts, let alone the relations between different patches.

Compactness through Autonomy

While the idea of autonomy is regularly discussed in urban studies with regard to the political autonomy of cities (cf. Stasavage, 2014), it seldomly appears in the field of urban morphology. Autonomy as a form of compactness is practically non-existent. Scoffham and Vale (1996) present an exception. Being published in the same book, their chapter comes directly after Thomas and Cousins' (1996) ideas on regional compactness, and the two also seem to have quite some thematic overlaps. Scoffham and Vale also prioritize the reduction of travel through walkable and mixed-use districts, adding that "[p]rogressively autonomous neighbourhoods of this size could each develop their own character [in] an increasingly polycentric city" (1996: 62). Hence, they have a similar view on efficiently assembling compact local units as it was articulated in the idea of regional compactness. They do, however, take this idea to a more conceptual level by elaborating further on the actions that are needed for such a structure to emerge, particularly "more localised power, more autonomy, more ability to make decisions [that] sustain its individuality rather than serve distant global markets" (Scoffham and Vale, 1996: 61). They therefore argue for more independence from exogenous forces and more control over endogenous resources. This "compaction of control" (Scoffham and Vale, 1996: 61) opens up a more holistic approach to measure and promote compactness.

Compactness through autonomy has a degree of abstraction that could make it quite suitable to respond to contemporary urbanization processes. As shown above, it applies to a number of scales: autonomous neighborhoods, cities, regions, and countries are all easily imaginable. However, particularly for the larger scales, the conceptual link to urban compactness might become rather weak. In the context of Mega-regionalization, it could be a worthwhile task to measure a region's dependence on global networks, and its capacity to sustain operation on the basis of local resources. Such an analysis can connect the idea of autonomy to specific characteristics of urban form. Regarding peri-urbanization, compactness through autonomy could help to dissolve urban-rural dichotomies by conceptualizing urban landscapes with regard to their own capacities - autonomous from cities and other fixed urban units. The latter is a very hypothetical point, but it shows the potential of autonomy to lead towards a more holistic approach to compaction.

Compact Flows

The idea to shift the focus from the compactness of urban form to the sustainability of urban processes comes from Michael Neuman's (2005) highly influential paper "The Compact City Fallacy". Neuman presents an extensive review on the paradoxical results of empirical studies on compact urban form, as well as the different interpretations of sustainability, concluding that compactness "is neither a necessary or sufficient condition for a city to be sustainable" (Neuman, 2005: 23). Instead, he argues that urban form should be

understood as a "processual outcome of urbanization" (Neuman, 2005: 23). Although this might be read as a suggestion to abandon the ambition of compactness completely, it can also be interpreted as a call to expand its understanding beyond form towards *compact flows*. Travel behavior and the consumption of resources - two of the most frequently mentioned issues of the Compact City debate - have obvious relations to the extent of the flows they create. Travel patterns, for instance, could be more sustainable if the distances travelled by people and goods are decreased. If Neuman's paper is understood in this way, it corresponds well with the debate on sustainable urban metabolism.²

The compactness of flows relates well to most contemporary urbanization processes. Planetary urbanization builds up on the understanding that urban environments are formal expressions of underlying processes of urbanization. Regionalization, and particularly regional development theory, is coined by the idea of functional urban regions that often expand spatial entities such as administrative borders (Dawkins, 2003). The debate on peri-urbanization still lays a strong focus on urban form, but recent initiatives show increasing interest in the metabolic structures of such spaces.³ Therefore, clarifying the relationship between urban form and urban flows - and the role that compactness plays in this - is a very timely and relevant issue.

Relational Compactness

The last alternative conception to be discussed here has been articulated recently by Kjaeras (2020) in her paper "Towards a Relational Conception of the Compact City". Similar to Neuman (2005), Kjaeras' (2020) reconceptualization is based on a critique that revolves around the two key observations that Compact City strategies mainly targets the transformation of urban form especially through population and building densities, and that sustainability assessments of compact development typically ignore external effects by referring to district and city boundaries. Accordingly, Kjaeras' proposal for a relational conception of compactness is twofold. Firstly, she argues that compaction strategies should be based on an understanding of cities as assemblages, meaning the definition of urban form through the "*cofunctioning*" of elements (Kjaeras, 2020: 8; italics in original). Secondly, she suggests that the analytical and strategic boundaries of cases should be reconsidered by "empirically identifying key drivers, rather than through territorial means" (Kjaeras, 2020: 13).

Since Kjaeras' (2020) critique and conception is closely linked to the work of critical urban theorists (e.g., Brenner and Schmid, 2015; Harvey, 1973; Merrifield, 2013), the relational conception of compactness fits

² Specifically the idea of localization as the basis for "short circuit economies" illustrates the attractiveness of limiting the range of urban flows (van Timmeren and Henriquez, 2013). In this sense, exploring the compactness of flows could form a link between the debates on compact urban form and sustainable urban metabolism.

³ For instance, the European research project "Resource Management in Peri-urban Areas" (REPAiR; www.h2020repair.eu) focuses on waste streams and other flows in metropolitan areas throughout Europe.

well into the debate on contemporary urbanization processes. The call for expanding and dissolving territorial boundaries of Compact City research is obviously related to Planetary Urbanization. The relational aspect of mutually reinforcing functions and elements can also be found in the theory on mega-regionalization (e.g., Gottmann, 1957; Hall, 2001). Peri-urbanization also emphasizes the relationships between elements of the built environment regardless of fixed urban-rural characteristics ⁴ (Wandl et al., 2014).

Table 1. Overview of how the alternative conceptions of urban compactness relate to the theory on contemporary urbanization processes. (+) = extensive relation; (o) = moderate relation; (-) = no or insufficient relation. Source: Authors.

	Regional Compactness	Compactness through Autonomy	Compact Flows	Relational Compactness
Planetary Urbanization	(-) Fixed spatial scales, limited to the district and city-level.	(o) Multi-scalar application imaginable, even though fixed urban units are conceptualized.	(+) Acknowledges transformational processes as the basis of urbanization.	(+) Similar attempt to dissolve fixed classifications of urban units and consideration of planetary effects.
Mega-Regionalization	(-) Limited to local and regional factors, no reference to global issues.	(+) Opens the discussion of an analysis of regional resource capacities.	(o) Relates to the idea of functional instead of geographical urban regions.	(+) Acknowledgment of mutually reinforcing functions on multiple scales.
Peri-Urbanization	(-) No space for conceptualizing in-between conditions.	(o) Sparks thoughts of conceptualizing peri-urban areas independent from urban-rural classifications.	(o) Relates to initial thoughts of capturing functional interactions in peri-urban areas.	(o) Emphasis on relationships between units, irrespective of urban-rural classifications.

Discussion - Empirical Measures

The review of alternative conceptions of urban compactness shows that while three of the conceptions can be adequately linked to theory on contemporary urbanization processes, one of them - *regional compactness* - has insufficient links to the theories (see Table 1). This suggests that *compactness through autonomy*, *compact flows*, and *relational compactness* are more promising for further research. As an additional argumentative element, this section discusses the potential to translate the four themes into empirical measures of compactness.

Figure 1 shows diagrammatic visualizations of morphological measurements that could spatially express the four themes. Illustrated on a generic and scale-less urban structure made of infrastructural lines and land use patches, it is shown that each of the themes can be easily translated into a simple spatial measure: *regional compactness* could include the measurement of the centrality of an area based on the infrastructural network, particularly public transport; *compactness through autonomy* could delineate one or multiple areas and measure some kind of diversity within them; *compact flows* could take similar centrality measures as

⁴ Although this relation is less clear than for the other two theories, since Peri-urbanization proposes a new, independent unit, which makes it seem to slightly abandon the idea of dissolved urban units.

regional compactness, but focus more on measuring network centralities as approximations of human flows appearing within it; lastly, *relational compactness* could combine measures for centrality and diversity as it identifies different functions in the area and assumes their potential interactions through the given network properties, as well as the relation to specified functions outside the focus-area.

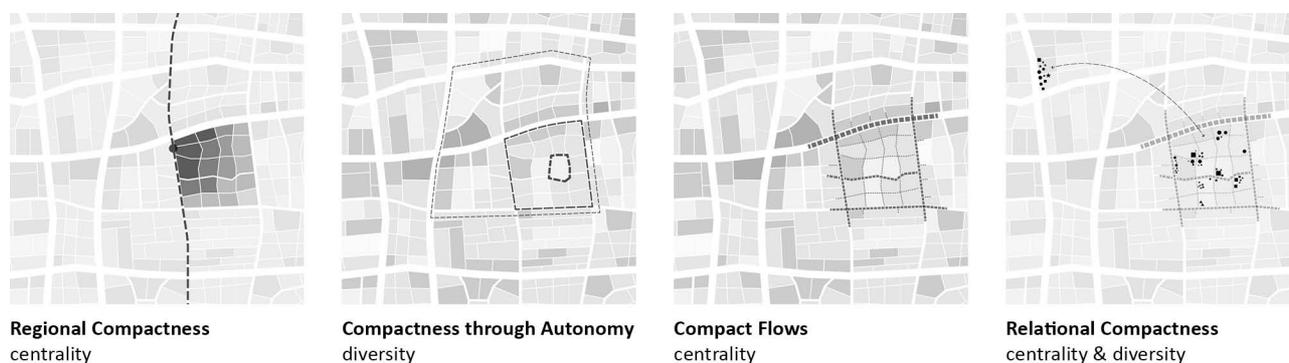


Figure 1. Overview of diagrams that illustrate possible empirical measurements for each alternative conception of compactness (on a generic urban network with no defined scale). Source: Authors.

The measures presented here are of course only some of many possible translations of the alternative conceptions of compactness. However, they reinforce the impression of the literature review that compared to the other three conceptions, regional compactness is oversimplified. Especially compactness through autonomy and relational compactness present promising theoretical foundations for multi-scalar measures that combine different metrics.

Conclusions

Despite some nuances between the different conceptions of urban compactness, the discussion presented in this paper allows for two general conclusions. Firstly, there are significant overlaps between the ambitions articulated in the conceptions and the issues outlined by urbanization theories. This suggests that Compact City research can potentially contribute to contemporary urban issues. Secondly, the proposed empirical measures show that alternative conceptions of compactness can help to lift Compact City research and practice beyond the conventional focus on density. Shown here are measurements like functional diversity and network centrality, which expand the focus of compaction through increased building heights and population numbers.

The review presented in this paper often shows tendencies of drifting away from both the focus on the Compact City and the focus on urban form. Even though this poses a threat of defeating the purpose of making a valuable contribution to the field of urban morphology, this can improve the impact of urban morphology to a broader discussion on sustainable development. Particularly the understanding of urban form as both a cause and effect of urban interactions is crucial to expand the debate on compact urban form beyond a disciplinary silo.

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