Understanding Urban Forms as Results of a Conditioning System of Interrelated Factors – Some Thoughts on the Issue of Morphologically Defining the City

Since the beginning of a theoretical occupation with the "city" there is a large uncertainty in defining what urban form is and what it eventually consists of. As a matter of fact, we somewhat instinctively attribute morphologically completely diverse urban entities with this term, notwithstanding their often utterly unlike topographic settings or cultural backgrounds. Moreover, we do so not only with properly existing entities, but expand our "idea of the city" also over the past: for us ancient Ur in Mesopotamia, medieval Rothenburg in Southern Germany, and contemporary Mexico City are cities all the same. And yet, until today we do not find considerable comprehensive explanations for the "city" which cover all its aspects – without being then so universal that they concurrently define various circumstances of human life other than only the urban one. At the same time we do find plentiful statements on different urban aspects, depending on the discipline the author is affiliated with: archaeology, economy, geography, history, law, sociology etc., five of which shall now be quickly revisited:

The historian Georg von Below (1858-1927), for instance, apostrophized four urban attributes: market, fortification, local jurisdiction, and civic autonomy to distinguish cities from other settlements and the countryside (Below, 1898; Below, 1909). As valid as these were for his purpose of dealing with medieval German cities and towns, they prove useless as soon as we apply them to other cities if we are not prepared to engage in extensive interpretation of his original terms. Moreover, Below's legitimate observation that urban institutions are more elaborate than rural ones, producing a hierarchy in which the countryside is subordinated to the urban nuclei, is untenable not only for our contemporary "edge cities", but also for the

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ancient Greek poleis with their concept of integrating city and countryside into one political entity.

The archaeologist Vere Gordon Childe (1892-1957) concentrated on the early urbanization seeking to investigate the factors that determine the concept of the »city«. His ten criteria deriving from archaeological data, however, remain static as those seen with Below. A major objection against his delineation is the equivalence of the proposed criteria, which in addition produce no functional relation among each other (Wheatley, 1972, p. 612). Yet, they represent, as a full set, a logical threshold within his sound evolutionary model explaining the development of mankind by means of its sedentation, urbanization, and industrialization (Childe, 1934; Childe, 1936; Childe, 1950); but do they seem to be sufficient to fully describe other cities than the ones he relies on for his argument, let alone the »city« itself?

The social economist Max Weber (1864-1920), presented a widely renowned approach towards the task, taking up a whole chapter in one volume of his considerations on economy and society. He notices that the lowest common denominator of all varying definitions is that the city does not simply consist of a collection of one or more separate dwellings but is a relatively closed settlement, an "Ortschaft" (≈ locale), which in addition has merely quantitative features (Weber, 1921, p. 59). Giving many further geographical, economic, and legal clues, we derive from it predominantly the incongruence of the different criteria, which we have to consider while talking about cities – he deliberately refused to give a true definition. Compared to this elaborate employment yet, shorter definitions, as the two mentioned before, have to fail of necessity, when they are evaluated apart from their academic embedment or according to cities of different times, regions and cultures.

The geographer Friedrich Ratzel (1844-1904), and subsequently the geographic disciplines, however, took a more hands-on approach and defined the city as a permanent aggregation of human beings and human dwellings of a considerable size, which cover a significant area and locate centrally within major traffic routes (Ratzel, 1897; Ratzel, 1903). His historic geographical definition included the presence of a mural boundary, a traffic node (e.g. market square), the subdivision of the city into quarters, and the exceptional position in legal terms. Out of this slowly developed the current geographical definition, which assumes the arrangement of the city around a center, a central-peripheral gradient, a relatively closed and bulky
building development, and a physical and/or administrative subdivision. Here, Ratzel recognized 100 years ago the importance of traffic routes for the development of urban shapes and the transition of the city into the surrounding landscape, as well as the significance of the skyline – circumstances, which are ubiquitous in today's discussions.

Contrary to these theoretical approaches, nowadays the status »city« is yet assigned foremost due to statistical considerations, mainly according to the size of a settlement and the effective administrative structure of a region or state. Accordingly Danish authorities already consider settlements with 200 inhabitants as an »agglomeration« whereas the Japanese threshold lies with a population of 50,000; in Germany and the U.S.A. the corresponding sizes are 2,000, respectively 2,500 residents (Lichtenberger, 1986, p. 32). In addition we find many different classificatory approaches towards the city, distinguishing them due to size (population and/or surface – quantitative classification), or due to the predominant function (qualitative classification – monothetic taxonomy). Yet, the numbers of inhabitants within a randomly drawn political boundary as well as the percentages of labor in a specific branch still present weak criteria to give comprehensive descriptions for the city – especially when we seek to apply them to urban entities where we hardly can sufficiently collect the according data (e.g. archeological sites).

Obviously, all these employments present different viewpoints onto the phenomenon city, yet none of them comes to a true universal but still applicable statement. More interestingly, hardly any of them consider urban form as a primary source – even the evident function-form relation is under-represented. Moreover, we hardly find approaches of comprehensive definition by those who professionally deal with the planning or design of cities – neither in theory nor in practice. Ernst Egli (1893-1974) reduces the 'idea of a city' to its built order (Egli, 1959, p. 11). Charles Delfante (*1926) confines it to an 'urban composition' that is equivalent to a piece of music or a stage plan (Delfante, 1997, pp. 7f.). The growing uncertainty of how to plan and design cities today eventually aggravates the assignment; from most architects' and planners' perspectives the city is seen as a "field of forces in movement" (Seifert, 2003, p. 33), difficult to grasp and difficult to predict and consequently in its entirety an unpleasant object of research.
Yet, despite this definitory quandary, which due to the great variety of approaches and the still greater diversity of actual cities apparently is bound to persist, we do have the aforesaid »idea of the city« that presumably is even more settled on a commonsensical formal conception than on scientifically verifiable functional features: We recognize cities by taking a look at their layout from an airplane window or through a satellite image, by approaching a city's skyline in a car, train, or ship. We perceive urban space by strolling through its streets and places, or even by visiting deserted archaeological sites of long gone civilizations. For this perception, arguably, the sheer formal appearance is sufficient, to which we then of course add functional relations according to our contemporary understanding of urban life. Ultimately, one might speak of a »formal urban continuum« that for us exists since the Bronze Age and carries on until today and which without further thought is inscribed in our common knowledge as reference for any urban entity we encounter. But how can we approach this continuum and how do we explain its grand diversity?

In a philosophical perspective this understanding of a formal urban continuum is instantly tantamount to the idea of phenomena, that is that different appearances ultimately correspond to an original idea. This is still most tellingly illustrated in the 'Allegory of the Cave' (Plat. rep. 514a–519a), in which Plato (427-347 BCE) suggests that the properties of man's environment only represent shades and projections of their true being, which themselves remain invisible to most of the people. Still, these shades and projections will be ascribed various forms and given varying names, even when they go back to the true being of only one individual property. They are consequently man-made forms of and names for an abstract idea. Following these lines, we can identify cities as »artifacts« that is man-made forms, which comply with a commonly acknowledged but inchoate concept of the »city« necessarily including one but seemingly similarly inchoate »idea« of urban form. Only such an epistemological understanding allows us to conceive urban form also as an »abstractum«, a universally referential and perpetual idea, which allows us to understand varying forms as urban.

To approximate this formal abstractum of the city we might adhere to Giulio Argan (1909-92), who adopted from his art historian viewpoint that the key towards the understanding of phenomena is the focus on their qualities rather than their
quantities (Argan, 1983). Moreover, the qualities themselves have to be examined for their general 'value-qualities' (Scheler, 1916, pp. 42f.), that is those qualities, which do not only apply to a given object, but to all alike objects and thus transgress the limitations of a specific time-space frame, to which scientist usually are indebted to. With the employment of value-qualities we are thus able to tackle the problem of addressing cities of different topographic settings and also of different ages. Beyond this, we are at the same time entitled to exclude the numerous motivations for the building and re-building of cities – a field of research which is always bound to trouble the attempt for a universal approach to the »city« as we could also observe with historical, socio-political, economical and geographical undertakings. Being obliged to understand these motivations as likewise bound to specific time-space frames, they elude the here suggested generalist approach.

As for the examination of the »city« consequently, a phenomenological analysis has to start from its different forms to but eventually transcend these varying detectable physical assets, which are evidently bound to the time and place of their planning, production, and utilization. This will ensue by focusing the value-qualities of these forms, or by investigating something that might be called »common denominators causing urban form« – which concurrently cause the actual urban formation as well as the actual urban functioning process. To do so, we again find support with Argan and his assessment of the shortcoming of mere empirical methods and exact sciences for a full examination of phenomena (Argan, 1983, p. 27) – a thought that also corresponds to a Kantesian understanding of cognition (Kant, 1781). Accordingly, the here suggested approach has to rather base on our regulative capacity and its inherent, so to say »metaphysical categories« than on mere empirical competence and subsequent scientific classification.

Along these lines and taking Below's verdict on the necessity of a market within a city as an example, one ought to resolve that the mere existence of a market in any city is not sufficient for a common denominator, as we cannot attribute value-qualities precise enough to distinguish a market place from other type places within an urban context. We will have to expect the common denominators causing urban form to be flexible and comprehensive to meet all potential formal results: Bazaar, Supermarket, Stock Exchange … all of them show a relatively high accessibility, high density, and high diversity versus its surroundings, all of which cannot be expressed in one qualitative concept. This is due to the specific relationship between quantity and
quality with respect to urban form: Whereas quantity in this context describes all voluminal characteristics of the different artifacts, which we might also understand as the sheer physical existence of urban form, qualities correspond to the abstract relevancy of these voluminal characteristics. Yet, even though function and form show the same division into intangibility and tangibility, for our purpose it is seemingly inappropriate juxtaposing or confusing both dichotomies: When urban forms as results of certain motivations succeed the intended functions ["form ever follows function" (Sullivan, 1896, p. 408)], the qualities are inherent in quantities, usually meeting various functional demands at a time as well as they are able to meet more and other demands as contemporarily foreseen. The value-qualities in question, furthermore, are detached from immediate functions affecting the urban artifact and representing universal values in regard to urban form itself.

With respect to the issue of morphologically addressing the city consequently, the different value-qualities together constitute the abstract formal idea or an so to say »ideal city« which itself serves as an unconscious point of reference for any urban entity we encounter – a supposedly reliable explanation for the existence of the formal urban continuum in question. Interestingly enough, it thus describes an approach that bases on urban form and therefore can be named morphological without focusing a concrete urban physis (for instance by means of town plan analysis). Still, moreover this phenomenological approach also immediately implies that the different value-qualities interact which each other to eventually cause factual urban forms, which largely differ from each other. They also largely differ from a potential »factual ideal urban form« that in the history of the city was often aimed for – in vain. Even under identical preconditions and prerogatives, cities do not develop alike, nor will we be able to set up an urban recipe guaranteeing a successful implementation and development. Obviously, while the now summarized phenomenological approach allows for a search of common denominators causing urban form and to investigate the foregone interrelation of their intrinsic factors to explain, why certain entities became or are cities (or even why they forfeit their urban status), neither the different factors that base on these denominators nor the denominators themselves show one-to-one relations to their caused urban form and consequently do not produce predictable interactions.
The phenomenological approach (Ley, 2009: p. 82)
To illustrate the particularity of this interaction we are obliged to consult another scientific field: system theory. Still most convincing with regard to the inevitable failure of applying one-to-one relations in urbanism is the treatise "A city is not a tree" by Christopher Alexander (*1936), in which he illustrates the functional interdependencies within urban system and rejects simplified hierarchical structures for their formalization (Alexander, 1965). Yet, also within our quantity–quality dichotomy we should discern systemic relations and interdependencies, as playing an important role for the eventual development and mutation of phenomenal urban forms. On one side this particular system, as we have seen earlier, results from the inherence of quality in quantity, that is the response to various (also alternating) qualitative aspects within one urban artifact. On the other side the urban artifact, as a product of various parties concerned and involving an even larger group of people affected by the artifact, of necessity constitutes a system of individual facts and actions; this peculiarity, which differs largely from artifacts habitually produced only by one person or a limited group for the use of a similarly limited group of people, also affects the relation between the different phenomena and the ideal city just discussed. Consequently an understanding of the city as a system also refers to the abstractum urban form, which likewise has to include the notion of producers and consumers of different urban qualities.

Thus, we are under the constraint of comprehending that the attributes of a system cannot be fully explained out of the attributes of its components (Leighton, 1959: 200). Moreover, the system »city« is a sociophysical entity composed of many elements in interaction (Ferguson, 1975, p. 12), which is dynamic, synergetic, self-organizing and adaptive, that is that it is ongoingly changing in regard to evolving demands and obstacles, likewise affecting urban dwellers and urban form. Urban systems, thus, are neither linear, a false consideration which already misled modernistic designers and planners in searching for an orderly city, nor generally chaotic, as many people concerned with urban development suggest today to withdraw from comprehensive planning. Moreover, they mostly conform to open systems, or, as Ilya Prigogine (1917-2003) determined them for his mechanical model of non-equilibrium processes, with »dissipative structures« that are '[…] a medium thing between pure coincidence and a redundant order' (Prigogine et al., 1993, p. 123). In his works Prigogine reasoned that most explorations in statistical mechanics base on the notion of closed systems in a thermodynamic equilibrium,
which is hardly applicable for dynamic processes, as they are usually subject to a permanent flow of energy, matter, and/or entropy. These open systems may develop a »higher order« depending on the system parameters, but may as well return to a »chaotic stage« when experiencing only little variation (Nicolis et al., 1977; Prigogine, 1955; Prigogine, 1984).

His considerations included a substantially new approach towards a main traditional scientific principle, namely the supposed parity of prediction and retrodiction, that induces reversibility and consequently seduces to suggest a determination of dynamic processes. Based on chaos theory, with dissipative structures we encounter mechanical trajectories, which are explicable only retrospectively through the inclusion of varying system parameters as well as evolving entropy between the involved parties. Their future courses, however, are subject to probability rather than scientific certainty. Hereby we find the notion of a continuous time bar included into scientific reasoning (Prigogine et al., 1993, pp. 9ff.) that cannot be adjourned for the sake of a putative proper objective model. Similarly to this notion of irreversibility Prigogine asserted the irreducibility of probabilistic descriptions, that is the impossibility of transferring descriptions of the whole system to single inherent trajectories (Prigogine et al., 1993, p. 14f.). Dissipative structures, however, are characterized through a further development of dynamic equilibria based on dissipation, that is the utilization of energy. The order of a dissipative structure is thus maintained through an ongoing supply of energy altogether representing an energetic imbalance or disorder; this stationary stage of the order might consequently be easily affected by changes of its vicinity, and will not return to its origin by an inversion of the process.

While seeking to understand these thoughts that derive from natural science, one can easily trace the parallels between thermo-dynamic and urban systems. Also a city must be seen as a complex shaping process rather than a simplified shaped container (Argan, 1983, p. 84). Moreover, both systems can be understood as 'non-trivial machines', whose variable internal condition produces inconceivable many results without the possibility of an effectual empirical verification (Foerster, 1985, pp. 62ff.). With both it is evident that even after identifying all possible implications – itself an almost impossible endeavor – and presuming a not given static attitude of the system, the respective outcome is unpredictable. They are living systems that never reach final but continually intermediate states or results, which again affect the
The systemic approach (Ley, 2009: p. 104)
ongoing processes. Being consequently multi-complex and repeatedly ambiguous, still the system city is not chaotic! On the contrary it does underlie a contingency that, as stated by Niklas Luhmann (1927-98), does not result in arbitrariness due to 'conditioning formulas', which are inherent to all sociophysical systems and their components (Krause, 1996, pp. 158 & 160). With respect to Foerster's idea of the non trivial machine one could thus simplify: Even though the mode of operation and outcome of different urban systems is inexplicit, they are still comparable because they are subject to the very same conditioning formulas.

Summarizing the phenomenological and systemic thoughts raised in this short account on the issue of morphologically defining the city, one can come to the following preliminary conclusions:

- We do understand varying urban forms as cities because they relate to a commonly agreed abstract morphological reference.
- This morphological reference is determined by a certain number of value-qualities, which work as common denominators or parameters of urban form.
- These parameters of urban form interrelate in a systemic context that is multi-complex, dissipative and consequently unpredictable and irreversible.
- Immanent to this systemic context is thus that the urban forms resulting from the interrelation of its parameters largely vary from each other.
- Still the systemic interrelation of the parameters is contingent and works itself as a conditioning formula for all urban systems.

Apparently this reasoning cannot at length describe the various implications resulting from such a combined phenomenological and systemic understanding of the city. However, with respect to the various definitory testimonials as regards the city in the beginning of this contribution, it shall draw attention to one possible urbanistic approach towards the task of defining this grand achievement of human civilization. For architects and planners, as those responsible for the shaping of cities, urban form and thus urban morphologies should represent the starting point in this great endeavor – while understanding urban forms as phenomenal results of a conditioning system of interrelated factors could represent one possible scientific basis for more according investigations to come.
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