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DEVELOPMENT OF A CONFIGURATIONAL TYPOLOGY FOR MICRO-BUSINESSES INTEGRATING GEOMETRIC AND CONFIGURATIONAL VARIABLES

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ABSTRACT

In cities manifold actors are continuously taking decisions and proposing interventions, which are driven by, but also change, spatial conditions and their performance on a variety of scales. Understanding how this interplay works is crucial for urban designers and planners. However, this complexity asks for new methods of analysis or combinations of existing methods that better inform urban designers which is exactly what this paper is aiming at. The use of typologies to describe a complex reality has been both attractive to practice and an important research branch within urban morphology.

This paper presents a configurational typology that is not simply representing the physical environment, but rather its *affordances* (Gibson,1979) where we use as example the conditions needed for various kinds of micro-businesses. It combines properties that describe the position of a specific urban block within the street network of a city, characteristics of the direct surrounding of a block as well as characteristics describing the plot configuration within a block. The spatial characteristics most often associated with the spatial organisation of activities were selected from literature.

The statistical method of two-step-clustering was used to distinguish clusters and thereby the different types of configurations. The clustering was tested in an explorative process to understand which characteristics were relevant to distinguish the main urban configurations of the urban system. The results are presented for the city of Amsterdam. The same method can be applied to other phenomena such as co-presence as well as other cities and thereby allows understanding the variety of such types, but also the existence of generic types. In a next step this typology could be tested for applicability in practise.

KEYWORDS

Configuration Typology, Urban Morphology, Space Syntax, Micro-Businesses

1. INTRODUCTION

In each city manifold actors are continuously taking decisions and proposing interventions that are driven by, but also change, spatial conditions and their performativity on a variety of scales. Understanding how this interplay of conditions, interventions and performativity works is crucial for urban designers and planners. However, its complexity asks for new methods of analysis or combinations of existing methods that better inform designers about the possible outcome of their interventions.

Martin and March identified in 'the grid as generator' (Martin and March, 1972) types based purely on geometric characteristics (Moudon Vernez, 1992). However, studies following this tradition also show shortcomings as these mainly examine the individual components of urban environments and how these relate to one another ignoring the system dimension of such components. To overcome this we integrated Martin and March's approach with the space syntax approach (Hillier and Hanson, 1984). Typical for the latter approach is the explicit reference to "the position of any given space within the structure of the configuration of the whole" (ibid).

From a design theoretical perspective two aspects are important to the generation of new design proposals and a successful design process, that is a generative and an analytical theory (Moudon Vernez, 1992; Hillier, 1996). The latter, concerned with the actual effects of new proposals or its performativity, is far less developed (Marshall, 2012) to which this paper aims to contribute to by developing a configurational typology that allows for the evaluation of existing or created affordances (Gibson, 1979), that is, the evaluation of created possibilities.

These two aspects in design theory can also be recognized in a matrix presented by Gilliland and Gauthier (Gilliland and Gauthier, 2006) that summarizes differences and similarities between various approaches within the field of urban morphology (figure 1, authors interpretation). On the one hand the approaches are classed from being mainly generative-prescriptive (i.e. normative approach) to analytic-descriptive (i.e. cognitive approach). The other axis shows the focus of the approach spanning from being more interested in the internal characteristics of the urban environment (i.e. internalist approach) to being more focused on the social or economic factors influencing the evolution of urban form (i.e. externalist approach). Our concern now is mostly with the horizontal axis of the matrix between generative and analytic approaches.

What is important here is to mention that this matrix is not proposing a dichotomy between the two, generative/normative on one side and analytic/descriptive on the other side. It is easy to fall in that trap with practice standing on one side and research on the other. What is, however, of great interest, is the position in between where approaches such as environmental-behaviour studies, place studies and typology -morphology studies, we propose, can be located (see figure 1).

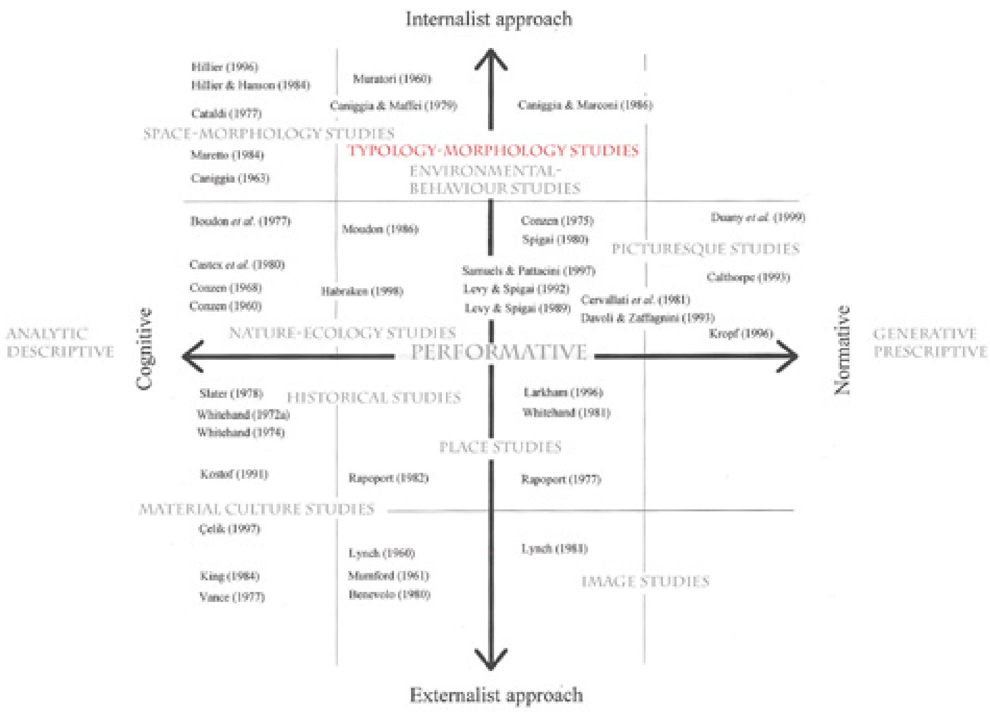


Figure 1 - An overview of the categorization of urban morphology research where typo-morphology, amongst others, is suggested to bridge between analytic/descriptive and generative/prescriptive research; freely based on Gauthier and Gilliland (2006, p. 46), Moudon (1992) and Berghauser Pont and Marcus (2015).

The typological approach presents great potential as it enables to include the complexity of the urban landscape both in terms of character and scale. Recent studies have shown the success of such approaches, e.g. Berghauser Pont and Haupt (2010), Gil *et al*. (2012), Barthelemy (2015). This is important for two reasons: First, to analyse urban conditions in its full complexity or, in other words, to evaluate the spatial characteristics and distributions in a city at all scales that, in turn, can accommodate diverse needs. Second, to inform urban development. It is especially here, typologies can be so powerful, because they enable to bridge between research and practice and we can make the full complexity of the urban landscape accessible for professionals in urban planning and design.

1.1 CONDITIONS FOR MICRO-BUSINESSES

The configurational typology presented in this paper focuses on the description of conditions for micro businesses in mixed-use environments. Micro businesses represent a crucial component of mixed-use environments, and have been in focus in many current visions and urban strategies, but little is known of how to actually spatially realise such a programmatic mixture to become true. Considering that activities are changing more frequently than physical form does, and emphasising the performative approach towards configurations, it is necessary to aim for a typology that is purely spatial, and not mixing form and function. We aim thus for an understanding of which configurations create what affordances, thus exploring possibilities rather than determining specialised spaces.

The literature review focussed first more generally on landscape ecology and urban morphology research, describing the general subdivision of land as well as its edges and transitional spaces (Vernez Moudon, 1994; Forman, 1995; Dramstad, Olson and Forman, 1996; Habraken, 2000). These morphological properties are important for a large range of social and economic processes in cities such as the distribution of economic activities (shops, production places, etc.) and social phenomena such as pedestrian flows.

In a second step, we looked more specifically on research from the field of space syntax where the main focus is on the configurative properties on the urban environment and often focussing on the influence of the street network configurations on economic activities (Hillier and Hanson, 1984; Marcus, 2008, 2010; Chiaradia, Hillier and Schwander, C., Wedderburn, 2009; Sardari Sayyar and Marcus, 2013; Scoppa, 2013). Recently, other than pure network-focused studies have been added such as studies on the effect of built density on economic activities (Berghauser Pont & Haupt, 2010), studies on the relation between retail and different aspects of urban configurations (Sevtsuk, 2010), micro businesses of service or production and different aspects of urban configurations (Hausleitner, 2010, 2014). All these researches provide interesting results on the relation of (micro-) business activities and urban configurations, but more research is needed in order to approach urban configurations in a more multi-scalar and systemic way and investigate, which configurations create affordances for which activities.

It is not the purpose of this article to come to a final understanding of the affordances of different urban configurations for different micro businesses; the construction of a configurational typology proposed in this article should rather be seen as the first step towards this understanding.

The range of spatial characteristics pointed out in the above-mentioned studies is wider than what will be considered in this paper. The characteristics smaller than the plot, for instance, were considered as not primarily systemic. Examples for those non-systemic spatial characteristics are the density of entrances per street segment length, the intervisibility for streets or the height of ground floors in buildings. Although these characteristics seemed crucial for micro businesses, they are not systemic and further, one cannot collect them citywide and will thus not be part of the developed typology.

1.2 TYPOLOGIES: DESCRIBING A DIVERSITY OF CONDITIONS

Investigating urban conditions from the morphologic perspective by means of a multi-scalar and multi-variable typology allows understanding the diversity of conditions within an urban system. Further it allows evaluating the potential of the different conditions as well as the affordance of the diversity of conditions in the whole urban system for future development on both, the local place and the urban system as a whole.

Typologies are used in favour of classifications to distinguish urban environments, because classifications refer to an explicit distinction of characteristics, whereas types can share partially similar components (Hempel and Oppenheim, 1936). A typology can thus represent better urban environments built from multiple components. Some types may have similar shared components. The specific composition of multiple characteristics though shape distinctive types of urban configuration.

When it comes to identifying urban types, two approaches are used within urban morphology. The first, known as the Italian school following the work of Muratori (Muratori, 1950, 1959; Muratori *et al*., 1963) and Caniggia (Malfroy and Caniggia, 1986; Caniggia and Maffei, 2001), identifies types as "cultural entities rooted in, and specific to, the local process of cultural development" (Kropf, 2009). Although the Italian school of morphology already described typological elements on the larger scale in the morphological studies of Genova, Rome, Florence and Venice, there was no method to compare spatial conditions on the extent of a whole urban system, with a higher resolution detail, as the urban block or building (Caniggia and Maffei, 2001).

The second approach builds on the work of Martin and March presented in 'the grid as generator' (Martin and March,1972) and identifies types based purely on its geometric characteristics (Moudon, 1992). The latter fits our aim better as we are interested to study spatial characteristics independent from the process of development or evolution over time and independent from the affordances it creates. Martin and March's approach (ibid) of quantifying urban environments became important for two reasons: first, to understand the complexity of entire spatial systems and specifically the relation between its elements, and second, to achieve a higher precision in the understanding of urban form.

However, studies following this tradition also show some serious shortcomings as these mainly examine the individual components of urban environments and how these relate to one another ignoring the relative or systemic dimension of such components. To overcome this, we propose to integrate Martin and March's approach with another approach in urban morphology described by Kropf (2009) as the configurational approach, better known as the space syntax approach (Hillier and Hanson, 1984). Typical for this approach is the explicit reference to "the position of any given space within the structure of the configuration of the whole" (ibid). Together these cover what Moudon (1992) described under the heading space-morphology.

Section two presents a method to identify configurational types that are integrating intrinsic characteristics (i.e. individual components) of an area and extrinsic or configurational qualities, that is, its position in the city structure as a whole. In the third section, the configurational typology is presented for Amsterdam. Besides the identification of types and its geographic distribution in the city, differences and similarities between the types will be discussed. In the last section the applicability of the method in urban design practice will be discussed.

2. METHOD

The method to develop a configuration typology consists of following steps: first, defining the aggregation unit, second, selecting a set of relevant spatial properties, third, calculating the properties per aggregation unit, fourth, organising the information per aggregation unit in a geo-database and fifth, distinguishing the configuration types by using a non parametric statistical clustering method.

The study area includes for the building of the typology the complete city of Amsterdam, keeping an additional zone of 5km around the municipal borders to prevent possible boundary effects. The final representation of the configurational typology includes all neighbourhoods of the municipality of Amsterdam, which comprise residential or residential and business activities.

First, the aggregation unit, the urban block was defined. The urban block was chosen as aggregation unit, since it relates the city scale configurational and morphological properties with the scale of the individual parcel or plot. Although aggregating on the urban block has limits due to not considering the influence of variations of the blocks´ surrounding streets on the different faces of the urban block, the unit of the urban block is still the most commonly used in urban design and planning practise to set rules for development. When looking at the basic block file of the city of Amsterdam, it became obvious that the definition of 'urban block' was not coherent in the whole city. The block outline partially equalled the building outlines, and in parts described what we know as closed urban perimeter blocks, being assembled from many buildings. The first was not done, because the buildings covered an urban block, but rather showing the distinction between built and un-built, or sometimes the distinction between public and collective, corporative or private ownership. This way of representation and definition allowed a conclusion on the compactness of the urban areas, but made it impossible to evaluate the potential of an urban configuration for different urban programme. Thus in the first step the borders of the urban blocks of Amsterdam were redrawn, representing in the new version units that were separated through public streets. Since this typology was developed as part of a research concerned with mixed use and residential tissues in Amsterdam, administrative neighbourhoods containing only business parks or industrial platforms were not included in the survey. Therefore 4835 urban blocks are covered by the configurational typology.

Following urban morphological characteristics were selected from literature to build a configurational typology that allows a comparison of spatial conditions throughout the whole city. They describe grain (size, fragmentation, density, edge condition) and accessibility, and refer to different scales, see figure 2 for the overview of properties and the scales they belong to.

	Grain	Accessibility
City scale		**Topology of street network** Topologic Choice 10.000 metric Topologic Integration r N
Fabric scale	Land Fragmentation Street network density in m/ha	Topology of street network Topologic Choice 800 metric Topologic Integration r 3
Block scale	**Grain size** Plots/ha Effective mesh size in ha	
	Built density Compactness of built space GSI Intensity of built space FSI	
	Edge condition Openess of the block border in %	

Figure 2. Overview morphologic properties of the typology – black: final used set; incl. grey: start set of typology formation

To make the measures comparable either indexes were used or density values, referring to ha. A set of ten measures (including black and grey printed items in table 1.1) was used to explore which ones can distinguish configuration types formed through the clustering. In the following the ten measures, which are all aggregated on the urban block, are described:

2.1 GRAIN RELATED MEASURES:

2.1.1 STREET NETWORK DENSITY (IN M/HA)

Streets are very stable parts of the tissue, and mostly are built before the buildings grow assembled in islands or blocks. The network is primarily defined as 'infrastructure with a certain structural robustness" (Berghauser Pont and Haupt, 2005). The system of the network of the public streets regulates the composition of the urban blocks (Meyer, 2005). Jane Jacobs (1961) points out that 'frequent streets and short blocks are valuable because of the fabric of intricate cross-use that they permit among the users of a city neighbourhood'. But the property of a dense street-network has to be supported also by other morphological parameters as well as governance parameters, because 'by too repressive zoning, or by regimented construction that precludes the flexible growth of diversity, nothing significant can be accomplished by short blocks' (ibid.). Generally, a block and its adjacent streets are interrelating and the properties of both need to contribute to achieve vital neighbourhoods. The street-network density was calculated in m/ha, considering all streets in a square of 800/800m from the centroid of each urban block. The street length is expressed in m/ha.

2.1.2 PARCELLATION (PLOTS/HA)

The amount of plots within a block was for a long time a model to structure urban territories, whereby "the system of plot division [is] strongly influenced by the system by which land is made available" (Meyer, 2005). The division of a block into plots allows a development spread over time as well as shared responsibilities. Further the structure of the plot division is an important contribution to the appearance of an area, as it supports sequencing along a street as well as probably a greater variety in design, with the pre-requirement of additional diversity of ownership. For the parcellation the amount of plots within an urban block were aggregated per block and normalised by the block size, and is therefore expressed in plots/ha.

2.1.3 EFFECTIVE MESH SIZE (IN HA)

The effective mesh size describes the fragmentation of the urban block and is hence an indication of the inner accessibility of the urban block. This property is derived from research on landscape ecology, describing landscape fragmentation (Jaeger, 2000). It is used to consider a blocks' internal fragmentation, which resembles the smallest independent grain. What on the one hand is increasing the permeability of the network can have fragmenting effects on the block scale. This measure is used here also to consider the effect of block internal streets and paths, which are known as crucial for the location of manufacturing businesses in the inner parts of larger urban blocks. The measure of the effective mesh size 'denotes the size of the areas when the region under investigation is divided into S areas (each of the same size At/S) with the same degree of landscape division: m=At/S' (ibid).

2.1.4 BUILT DENSITY (GSI, FSI)

Built density can be expressed in three different measures: the building intensity (FSI), Coverage or Compactness (GSI) and Spaciousness (OSR). Density is approached here as multi-variable phenomenon calculating FSI, GSI and OSR by means of the plan area, built-area and gross-floor area using Spacematrix developed by Meta Berghauser Pont and Per Haupt (2010). This method allows to draw conclusions on the distribution of density within a block, hence also on the influence of the specific built density on urban programme. For the cluster definition the two density indexes GSI and FSI are calculated, with the plan area being the brute block surface. GSI is calculated by dividing built area / plan area. FSI is calculated by dividing the gross floor area / plan area.

2.1.5 OPENNESS OF THE URBAN BLOCK'S PERIMETER (% OF BOCK BORDER)

The openness of the block or island perimeter is defined by the share of total border length accompanied by buildings and is measured in percentage. The openness of a block perimeter or the locations of buildings on a plot/in a block contribute to the definition and legibility of public and private realms. Further, higher or lower distance of a facility to the public space influences the suitability of a facility for certain types of businesses.

2.2 ACCESSIBILITY RELATED MEASURES

2.2.1 10. STREET-NETWORK-CENTRALITY MEASURES

The integration of the block in the city in general sets potentials in a wider context for what programme can succeed in an urban block. Being a property of the street-network, the topological integration analysis visualizes the potential of a street to be approached (integration) or used to pass through (choice). The method of Space Syntax developed by Bill Hillier and associates is used to calculate and visualize the configurational analysis that adds to the concept of connectivity the concept of depth, which is measuring the network distance steps of adjacency between network components, compare Hillier (1996) and Marshall (2005). Four measures are used to analyse vicinities to different centralities within the whole street network system of a city. These are on the city scale: Topological Choice 10.000metric and Topological Integration r N. On the fabric scale the measures are topological choice 800metric and topological integration r 3. The radius depends on what resolution we look at the city. The radius used to understand the integration of a street in the urban system is 10km, which refers to the complete urban system of Amsterdam, whereas the local radius used is 800m, referring to local distance in the Netherlands.

The values for all four measures are calculated using the program Depthmap by Space Syntax, whereby each street or street segment is assigned a specific value that allows understanding the role of each street in the whole urban system.

2.3 TWO-STEP CLUSTERING

All ten measures were aggregated on the urban block according to the descriptions per property above and the derived information was further organised in a geo-database. For the database each urban block was assigned a unique identification number, which were used to relate the information from the property calculations to the geometric shapes in the geo-information system. The geo-database built the base for the following step of statistical cluster analysis.

The requirements to build this configurational typology were first to employ a multi-scalar approach serving the complexity of urban systems. The construction of this kind of typology allows comparing spatial conditions on the city or regional scale. In order to build a typology automatized, the statistical method of two-step-clustering was used. This non-parametric method allowed the distinction of clusters without the necessity of basing on normally distributed data, which is often not the case when analysing spatial data.

The two-step cluster analysis is an explorative statistical method, which means that the final set of clusters is achieved after testing multiple variants – we tested for two clusters as minimum up to seven clusters. Additional requirements when building this typology were that all blocks were covered by the typology, the model of the clustering was at least fair, that all input morphological characteristics were of high predictor importance and that the ratio between the largest and smallest cluster was not too big in statistical terms. The clustering was tested in an iterative process with different input properties until all requirements were satisfied.

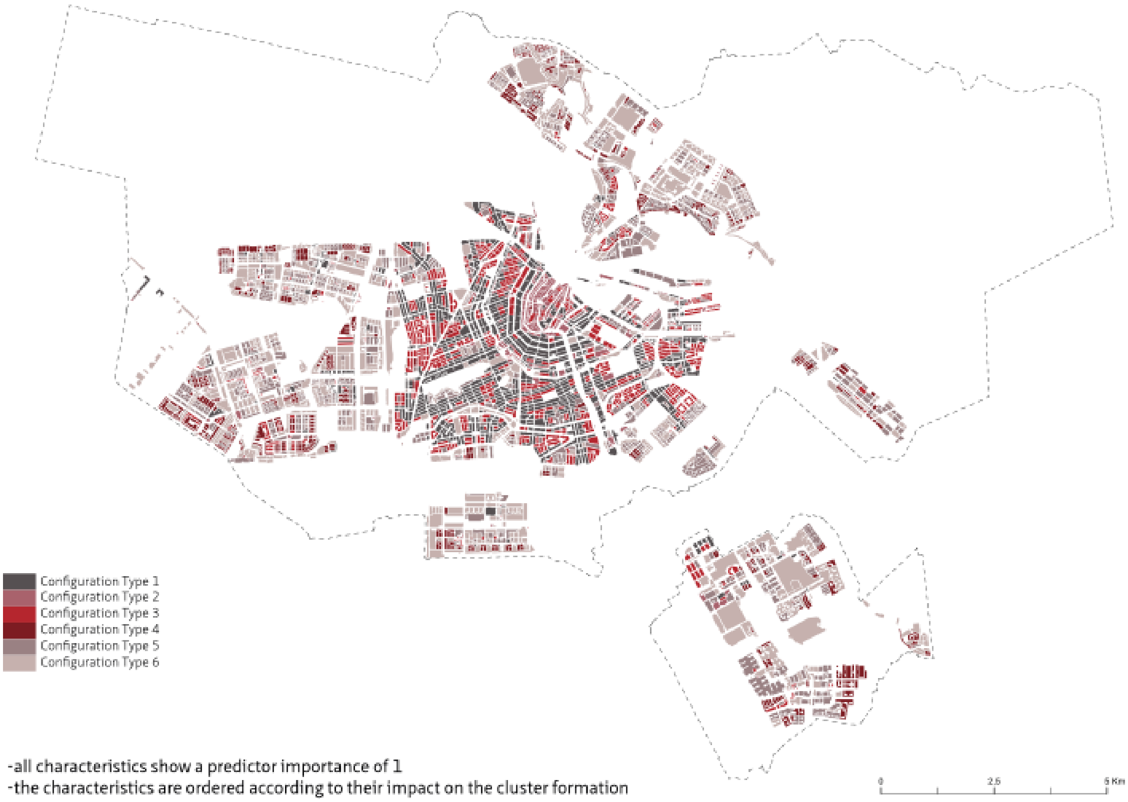
The automatized clustering found two clusters, distinguishing basically between the open and closed block city. This distinction represents the most general difference, is though for our purpose too rough to distinguish further differences of urban conditions. An example for this is that a closed urban block in a segregated location gives complete different conditions for possible urban programme or urban qualities than a closed urban block in a very central location. On the contrary a higher amount of clusters becomes too detailed and produces partially very small cluster sizes, which are not representative anymore on the city scale. Some characteristics were not relevant to build the typology because they had either low or no predictor importance, which was based for example on a too homogeneous manifestation of a characteristic on the city extent, like the street network density. The final cluster distinction is presented in the following section.

3. RESULTS

The final cluster distinction shows six different configuration types (see figure 3), built multi-scalar from five different urban morphological characteristics[1]. These are compactness (GSI) and intensity (FSI) of built space, openness of the urban block, the amount of plots/ha and the topological choice on the city scale (radius 10km). The other morphologic properties were not considered after the clustering tests, because they don't seem to highlight differences between types. Interesting to observe is that the properties on fabric scale (see the grey written parts in figure 2) were not important when distinguishing differences in the urban system, at least when it comes to micro businesses. Remarkable is hence that the typology is built upon morphologic properties from the city scale and from the urban block scale. The reason that street network density does not seem important is that it does not show in enough variability in Amsterdam. This does not mean that the variable as such is not important concerning the location of micro businesses but rather that it is not important to distinguish types in Amsterdam on the city scale.

The six types in Amsterdam comprise 4.865 urban blocks with the following size: n (Cluster1)= 839 urban blocks, n (Cluster2)= 339, n (Cluster3)= 759, n (Cluster4)= 676, n (Cluster5)= 1153, n (Cluster6)= 1069. (figure 4 presents maps of each individual type).

1 The five morphological and configurational variables were tested for collinearity in SPSS. The Variance Inflation Factor (VIF) values showed mainly values below 2; GSI showed values around 3 for the variables of topologic choice 10.000 and plots/ha. From these results we concluded that there is no considerable collinearity among the variables.



-all characteristics show a predictor importance of 1
-the characteristics are ordered according to their impact on the cluster formation

Amsterdam	
Size	4835 amount of blocks
Values	**Plots/Ha 24,3** P_IQ25=6,56 P_IQ75=63,47
	TopoChoice 13,73 TC_IQ25=12,66 TC_IQ75=15,14
	FSI 1,91 FSI_IQ25=0,98 FSI_IQ75=3,34
	GSI 0,48 GSI_IQ25=0,32 GSI_IQ75=0,95
	Openness 0,27 O_IQ25=0,02 O_IQ75=0,58

Types	1	2	3	4	5	6
Size	17,4% (839)	7,0% (339)	15,7% (759)	14,0% (676)	23,8% (1153)	22,1% (1069)
Values	**TopoChoice 15,92** TC_IQ25=15,43 TC_IQ75=16,62	**GSI 0,97** GSI_IQ25=0,94 GSI_IQ75=0,99	**GSI 0,99** GSI_IQ25=0,89 GSI_IQ75=1	**FSI 1,01** FSI_IQ25=1,01 FSI_IQ75=1,01	**Plots/Ha 8,33** P_IQ25=4,54 P_IQ75=18,47	**GSI 0,26** GSI_IQ25=0,18 GSI_IQ75=0,33
	Openness 0,03 O_IQ25=0 O_IQ75=0,12	**FSI 6,33** FSI_IQ25=5,04 FSI_IQ75=8,35	**Openness 0** O_IQ25=0 O_IQ75=0,05	**Plots/Ha 76,55** P_IQ25=63,24 P_IQ75=89,02	**GSI 0,41** GSI_IQ25=0,34 GSI_IQ75=0,49	**Openness 0,77** O_IQ25=0,63 O_IQ75=0,9
	GSI 0,97 GSI_IQ25=0,7 GSI_IQ75=1	**Openness 0,02** O_IQ25=0 O_IQ75=0,1	**TopoChoice 13,15** TC_IQ25=12,51 TC_IQ75=13,83	**GSI 0,39** GSI_IQ25=0,32 GSI_IQ75=0,45	**FSI 1,48** FSI_IQ25=0,95 FSI_IQ75=2,13	**Plots/Ha 7,7** P_IQ25=3,99 P_IQ75=18,16
	FSI 3,58 FSI_IQ25=3 FSI_IQ75=4,29	**Plots/Ha 76,8** P_IQ25=14,37 P_IQ75=124,36	**FSI 3,08** FSI_IQ25=2,54 FSI_IQ75=3,7	**TopoChoice 12,67** TC_IQ25=11,79 TC_IQ75=13,59	**TopoChoice 13,04** TC_IQ25=12,29 TC_IQ75=13,87	**FSI 0,88** FSI_IQ25=0,51 FSI_IQ75=1,53
	Plots/Ha 46,07 P_IQ25=19,07 P_IQ75=68,78	**TopoChoice 13,4** TC_IQ25=12,61 TC_IQ75=14,68	**Plots/Ha 47,89** P_IQ25=14,37 P_IQ75=74,01	**Openness 0,42** O_IQ25=0,22 O_IQ75=0,56	**Openness 0,38** O_IQ25=0,19 O_IQ75=0,51	**TopoChoice 14,52** TC_IQ25=13,4 TC_IQ75=15,57

Figure 3 - The configurational typology for Amsterdam. Overview of the six types and their distribution

Type 1. This configuration type consists mainly of blocks with a high regional topological choice value, which indicates a high potential of passers-by at these urban blocks considering the street network of the whole city. The borders of these urban blocks are rather closed, being maximum 30% open. The blocks are built with medium compactness and with a medium to high built intensity. The parcellation shows a rather wide range of values per hectare in this configuration type, no real high values though.

Type 2. The main defining morphological property for this configuration type is the very high compactness as well as intensity of built form. The blocks are predominantly closed or mainly closed. The parcellation shows a rather fine grain and the blocks are located along streets with lower to medium regional topological choice.

Type 3. This configuration type is defined by a high compactness and with exception only closed urban blocks. The blocks of this fabric type are located along streets with medium regional topological choice values. The built intensity shows medium values. The parcellation density appears in a rather wide range of values, which means an integration of fine grain and bigger grain parcellation.

Type 4. This configuration type is characterised by a very low built intensity, at the same time a very fine-grained parcellation, which relates to the building types of single-family homes. The compactness of built mass is low to medium and the urban blocks of this configuration type are located at streets of lower to medium regional topological choice values. The border of the urban blocks in this kind of configuration is half open to nearly closed.

Type 5. This configuration type consists mainly of blocks with quite large grain of parcellation, covered by a medium built compactness. The built intensity is low to medium. The streets of this urban configuration type have lower to medium regional topological choice values. The urban blocks show a broad variety of openness – from rather completely closed to very open.

Type 6. This configuration type is characterised by a very low built compactness and at least half open blocks. The parcellation of this configuration type is of rather large grain. These first three characteristics also relate to the presence of the large housing estates built in the 1960s that also can be found in this configuration type. The general built intensity of this configuration type is low and its streets show a very wide range of regional topological choice values, from very low integrated to very high-integrated streets.

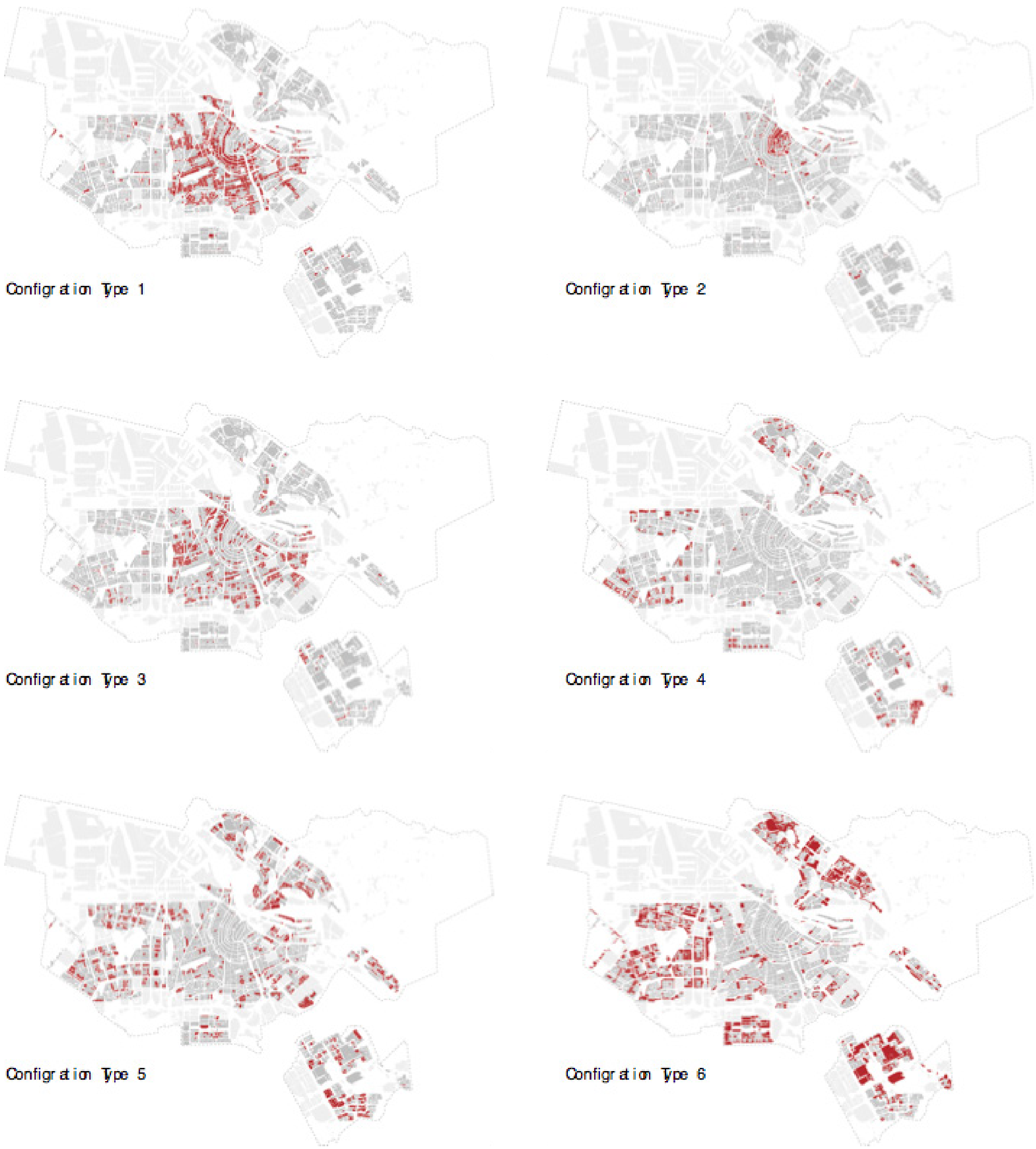


Figure 4 - Overview of the individual configuration types of Amsterdam and their geographic distribution

Some of the types clearly concentrate in certain parts of the city such as type 1 which dominates the areas built until the beginning of the 20th century. Although this concentration of the configuration type is visible, we can find this type of configurations also in all other districts of the city. The same is valid for the other configuration types.

These six types build a configurational typology that includes both, morphological and syntactical characteristics and as such is able to capture both what conceived space (blocks, squares, etcetera as items per se) and perceived space, (Lefebvre, 1974; Ståhle, 2008) taking into account the way we move around in the city, making the street space more important than the urban block that one never experiences as such. Moreover, this typology has a dynamic character, which can proof highly important for its applicability in practice. With "dynamic" we mean the belonging of a block to a certain type can change from one day to the other as a street is closed off for traffic which in turn changes the topological choice values for the whole city and possibly turning one or more blocks from being of one type to becoming of another type. As discussed earlier, this creates other potentials for various social and economic processes; in our case micro businesses that we know are related to these spatial characteristics. How exactly was not the aim of this paper, but will be central to another paper we prepare in which these types will be related to the distribution of micro-businesses. For the urban design practice this can be of high importance as intervening in the city is what designers do all the time. A configurational typology that changes with these interventions and as such can give feedback to the urban designer is more valuable than a static typology that cannot show impacts of spatial interventions.

4. DISCUSSION

The reading of an urban system through this kind of typology can be seen as an unfolding of potentials, and assessing affordances. The important and new aspect of this typology is that it allows identifying similar spatial conditions in different parts of the city. Even though a certain configuration type dominates each part of the city, we can find them in all areas of the city. That means that we can find divers spatial conditions in all parts of the city. Some areas show more homogeneous configurations; other areas are more diverse. The effect of more homogeneous or diverse configurations will be elaborated in further work.

In general, we can understand from the typology that urban morphologic characteristics of topological choice and built density combine in specific ways in certain areas in the city, something that is indicated in Hausleitner (2010) and discussed more in detail in Berghauser Pont et al. (2017). Whereas the different characteristics on their own represent components of urban morphological configurations, the relation between them manifests the types that build the performance base for different urban programme (in our case for micro businesses), and allow for evaluation of the affordance of an area and is thus analytic and generative at the same time.

The multi-scalar typology presented here is integrating five morphological characteristics: the division of a block into plots, compactness (GSI) and intensity (FSI) of built form, the location of a block regarding the topological choice of the surrounding streets relating to the complete urban street system, and finally the openness of the block. The topological choice measure explains the potential of a block to be passed-by in the system of streets. The division of an urban block into plots allows conclusions on the grain size and thus possible density of activities, being complemented on the block scale by FSI and GIS explaining capacity of the built material to accommodate activities. Openness as additional measure allows conclusions on the possible amount of interaction between the public street and the uses inside buildings. This measure also allows drawing conclusions on proximity or distance of uses from those inside and to other blocks. A low openness means that the border between the public and private is rather immediate. The façades of most buildings run along the block border. This does not mean that these facades are actually active, but the potential of being active, for interaction between the public and the private is there. The configurational typology for micro businesses presented here allows a characterization of the whole urban system in a systemic and precise way. Its meaning for other kind of activities and possible transferability to other systems are important issues to be elaborated in future research.

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