A grammar of urban fabrics. A toolbox of urbanistic rules in the Netherlands

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Abstract

In every urban fabric there are certain relationships between the city plan, the public spaces and the buildings. These relationships appear to be based on a set of building rules that could be called a 'grammar of the urban fabric', just like syntactic rules on the relationships between elements in a sentence are forming a linguistic grammar.

To clarify these relationships – and therefore this 'urban grammar' – a comparative research has been done for four different fabrics in the Netherlands: villages, suburban areas, urban areas and inner cities. For every type of fabric two examples have been examined. In this research the focus has not only been on explicit building rules as stated in design documents or policies, but also on implicit, unwritten rules that are 'hidden' in these fabrics.

Five elements have been studied: (1) the position of the fabric within the main structure of the city plan, (2) the parcelling plan and the block type, (3) the building type, (4) the density, measured in FSI, GSI and OSR, and (5) the transition between public and private domain, including the effects on the street scene.

The relationships between these aspects make out the 'grammar' of a fabric. When an urban design has to be made within the context of an existing city or village, it is essential that the urban designer understands the grammar of this context. This knowledge is necessary for a contextual as well as for a contrasting design – and even for a design without any context, because in that case the designer has to build his own grammar, based on existing rules.

Introduction[1]

In every urban fabric there are certain relationships between the city plan, the (network of) public spaces and the (parcelling plan with its) buildings. Every urban designer that is working on a design within a certain context should understand these specific relationships, because they tend to work as implicit building rules, which can be followed or denied. In both cases knowledge of these rules is essential, to be able to create a meaningful communication between the existing and the new parts of an urban fabric.

To continue on the parallel with communication, these rules could be seen as a 'grammar of urban fabrics'. The analogy between architecture or the built environment and language is at least as old as Vitruvius, and is present in many architectural theories since the Renaissance. A well-known example is the 1977 book by Christopher Alexander, *A Pattern Language*, that documents 253 'patterns' or design solutions (also on the urban scale), including 'grammatical' rules on their application.[2]

In this article we will focus on the sets of urbanistic rules that are implicitly or explicitly present in different urban fabrics in the Netherlands. Before we present these examples and the comparison leading to which rules are valid for what type of fabric, we will pay attention to the

[1] This article is based on research executed by staff members of the Department of Urbanism of the Faculty of Architecture of the Delft University of Technology, in particular Teake Bouma and Han Meyer. See: Meyer, Westrik, Hoekstra 2008, 68-93.

[2] Alexander 1977.

context of the research, to the elements of the 'urban grammar' that have been studied and to the selection of the examples.

'The fundamentals of urbanism'

This research on the 'urban grammar' of different types of urban fabric is part of a research programme called 'The fundamentals of urbanism', executed by staff members of the Department of Urbanism of the Faculty of Architecture of the Delft University of Technology. The starting point of this research is shown in the simple figure number 1, that shows the 'layers' of urbanism; or what the practice of urbanists consists of.[3] In general urbanists are making the given terrain (a) suitable for usage by people, with different programmatic elements (b). According to this approach the most important task in this process is to divide the terrain in a public and a private domain (c), because this division that defines the 'city plan' is lasting much longer than the buildings or street designs. Furthermore the city plan is elaborated by designing the public space (d), and by creating regulations or rules for buildings, for instance on density and block or building type (e). Urban fabrics that were not designed explicitly but developed organically instead can be analysed with these layers as well, in order to show the implicit, 'hidden' rules that are present in these fabrics.

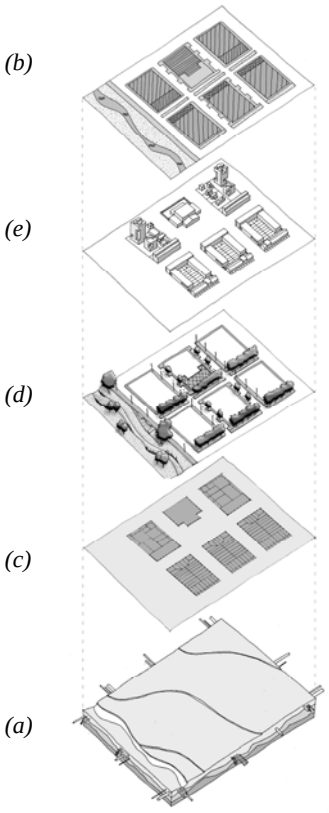


Figure 1. The 'layers' of urbanism.

[3] Heeling, Meyer, Westrik 2002, 19.

Elements of the 'urban grammar'

Therefore the 'urban grammar' we present here can also be related to this drawing: the rules that we are looking for are about the relationships between the different layers. The reason we call it an urban grammar lies in the following analogy with a linguistic grammar. The latter traditionally consists of two parts: rules on the syntax, thus on the relationships between verbs, subjects, objects and other functional elements in a sentence, and rules on the morphology, the relationships between morphemes when forming words.[4] Those rules vary from language to language. Differences can lie in the position of elements (e.g. the order of subject, object and verb in a sentence) or in their form (e.g. languages with a case system or different inflections).

In what we call the 'urban grammar' we can also discern rules on the relationships between different elements, and they differ from fabric to fabric. In this research on urban fabrics the relationships between five elements have been studied, and as said they are closely related to the layer drawing shown above:

1. the position of the fragment within the main structure of the city plan (layer c),
2. the parcelling plan and the block type (layers c and e),
3. the building type, including the orientation of the entrance (layer e),
4. the density, measured in FSI, GSI and OSR (layer e), and
5. the transition between public and private domain, including the effects on the street scene (layers d and e).

Selection of fabrics

These five elements have been used to clarify the differences and similarities between four different types of fabric, from rural to metropolitan: villages, suburban areas, urban areas and inner cities. For every type of fabric two examples have been examined. The selection of examples has been made in order to show striking contrasts and surprising parallels between them; they are not a representative reflection of the Netherlands. The selection consists of two old villages, Gees and De Rijp, one old suburban area in Rotterdam and one recent one in The Hague, one old and one recent urban area, again in Rotterdam and The Hague, and two inner cities, an old one in Groningen and a recent one in Rotterdam (see figure 18 for an overview).

Villages: Gees and De Rijp[5]

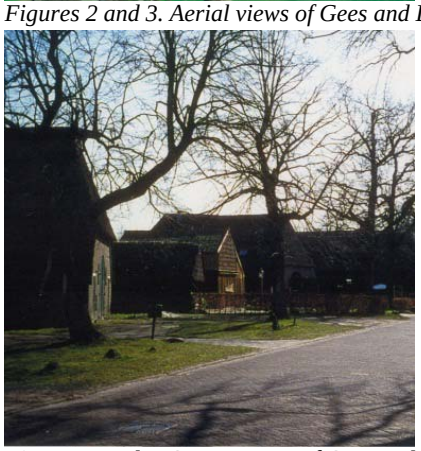
The first village called Gees is a small farmer's village with around 650 inhabitants. Here we found a longitudinal urban form with at first glance an almost random pattern of large

[4] Syntax and morpholoy also play an important role in urban research, e.g. in space (and place) syntax and morphology of urban fabrics.
[5] Van Olst a.o. 1991; Spek 2004; Gemeente Oosterhesselen; Meyer, Ros 2003.

farmhouses on yards of more than 1500 square meters (see figures 2 and 18). But by measuring the distances between the farms we found that they are quite similar. This can be explained by the historical development of the village: originally every farmer leased its grounds within a feudal system, and everybody had to keep a certain distance. In those days there were no real roads between the different parcels, only paths for the cattle to the communal 'brink' (village green). Because of this, a second striking point is on the level of the public-private transition. When we look at the orientation of the farms to the street, apparently all barns are situated at the front, while the dwelling parts are at the rear of the buildings. This leads to a very informal transition zone between public and private domain, with grass strips and no sidewalks.

The village of De Rijp (3000 inhabitants) is totally different. It used to be a fishing village, built on two sides of a dike. The water around the village is gone now, but its influence is still visible. Here again we found an implicit rule on the building orientation: while they are on narrow parcels, strictly aligned to the main structure of the dike, their main entrance is through a gate and alley, to the backyard where the fishermen originally could put up their nets. The front door is hardly used – until recently it was only used to carry out the dead. Even in new houses this orientation is often copied. It leads to a very formal, almost urban, street scene, but with an extended collective domain behind it, sometimes with extra parcels in second row.


Figures 2 and 3. Aerial views of Gees and De Rijp.




Figures 4 and 5. Street scenes of Gees and De Rijp.

Suburban areas: Rotterdam Vreewijk and The Hague Ypenburg[6]

The first suburban example is a garden village designed in 1913. Characteristic are the structural cross and the long spacious building blocks. In a quantitative sense we found out that all parcels are more or less the same size: 4.45 by 24 meters, and that the streets have the same width of 12 meters between the façades. But in a qualitative way two important, explicit rules seem to contribute to a diverse urban fabric and street scene: firstly, the open composition of the building blocks, with collective green space and collective buildings, and secondly, the detailed designed transition between public and private domain, with sidewalks, hedges and front gardens, and different types of trees in every street. With these regulations the designer M.J. Granpré Molière wanted to create different 'timbres', while keeping the parcelling plan and the buildings simple and strict.

In the next example this is the other way around. In this part of the recent The Hague district Ypenburg the variety is mainly in the architecture. In 1998 the Dutch firm West 8 created a mix of different dwelling types in so-called 'new building blocks', with smaller parcels in streets, and larger houses near public spaces like parks and canals. Beside this explicit rule on the relationship between public and private space they also proposed rules for setbacks in the building lines, different building heights, a mixed architects selection and strict material guidelines, to create a diverse but controlled street scene. However, in some blocks the cars are parked within the block, which leads to a main entrance at the back and a silent street as a side effect. In those cases the relationship between building type or orientation on the one hand and street scene regulations on the other is questionable.


Figures 6 and 7. Aerial views of Rotterdam Vreewijk and The Hague Ypenburg.

[6] Kuiper 1991; Steenhuis 2007; West 8 1998; Venema 2000.


Figures 8 and 9. Street scenes of Rotterdam Vreewijk and The Hague Ypenburg

Urban areas: Rotterdam Heemraadssingel and The Hague Vaillantlaan[7]

The next example, a 19th century district of Rotterdam, has some similarities with the last case, especially in the composition of the building block, although they are bigger in size (around 200 to 300 meters long, see figure 18). The size of the blocks gave the designer the possibility to make large parcels of around 390 square meters alongside the central canal, with on those parcels dwellings with a width of 7 meters. On the wide street to the city centre (east), the parcels are less large, around 270 square meters. The common street around the corner has parcels of 150 square meters. These explicit regulations have led to a diverse and mixed building block. For the transition between public and private and the architecture no explicit rules were made. But because all dwellings were built between 1900 and 1920 they are alike in type of masonry, ornamentation and use of bay windows and front gardens – a form of implicit building rules (see figure 12). Another difference with the last example is the strong design of the public space.

In the next The Hague case the focus is again on the explicit rules for the architecture, and here in its most strict version of a so-called 'typological palette'. The area is the final part of the regeneration plan of a 19th century district by Dutch architect Jo Coenen. In 1988 he redesigned the main axis, by demolishing all dwellings, widening the street and rebuilding it with apartment blocks. Most blocks are closed building blocks, some, like the one studied here, have another form, with a public function, in this case a school (see figure 18). The most striking aspect of this example is the street scene. The architects could only choose from restricted materials – grey stone for the ground floor and red bricks for the other floors – and a few window types. The price for this new monumentality is high: there is hardly any flexibility and all dwellings have a width of 5.4 meters.

[77] Peet 2000; Ravestein 1996.


Figures 10 and 11. Aerial views of Rotterdam Vreewijk and The Hague Vaillantlaan.


Figures 12 and 13. Street scenes of Rotterdam Vreewijk and The Hague Vaillantlaan.

City centres: Groningen Oude Boteringestraat and Rotterdam Weena[8]

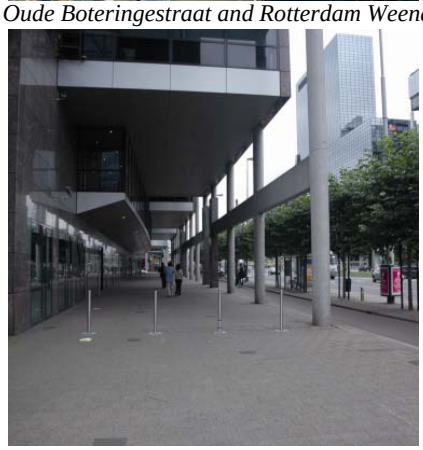
The two inner cities are very different types of urban fabric but they still have things in common. The first example is in the historical centre of Groningen in the north of the Netherlands with a street that dates from around 1100 AD. Because it was such an important connection between north and south the street got more dense in time. Since 1500 this part of the city consists of large building blocks with lengths of 300 meters. Within the blocks are several informal alleys, but the streets are very formal, with closed and strict building lines. There are only a few exceptions, like the Mennonite Church that was not allowed to have an entrance directly on the sidewalk (see figure 18). This juridical exception was copied as an explicit rule in the design for the public library of Giorgio Grassi from 1991. But those are the only exceptions. The street has a very consistent look, with its wide sidewalks of yellow bricks that are used as a transition zone between public and private and are filled with stairs and cafes (see figure 16).

The last example of the Weena in Rotterdam shows how critical the balance can be between implicit, 'hidden' or soft rules, and explicit, designed or hard rules. The design of 1981

[8] Rijksgebouwendienst 1989; Wagenaar 1992; Martin 1998.

proposed a 60 meters wide boulevard, with public functions and arcades on the ground floor, and offices and dwellings to a medium height of 40 meters. It should have worked as a monumental route for pedestrians from Rotterdam's main axis to the Central Station. But in the end the design regulations were not translated into legislation. Therefore the parcels of 100 by 100 meters were filled with tall office buildings and no dwellings. The arcades were built, but because there are hardly any public functions on the ground floor they are empty and not very well equipped for the proposed pedestrian connection (see figure 17).


Figures 14 and 15. Aerial views of Groningen Oude Boteringestraat and Rotterdam Weena.

Figures 16 and 17. Street scenes of Groningen Oude Boteringestraat and Rotterdam Weena.

Comparison: urbanistic rules

Figure 18 shows drawings of all examples that were specially made for this research, in order to compare the examples more easily. From top to bottom we can see the city plan and the parcelling plan, the building type, the density and the public-private transition. The comparison of the examples on these elements produces some interesting results, divided in four categories of relationships.

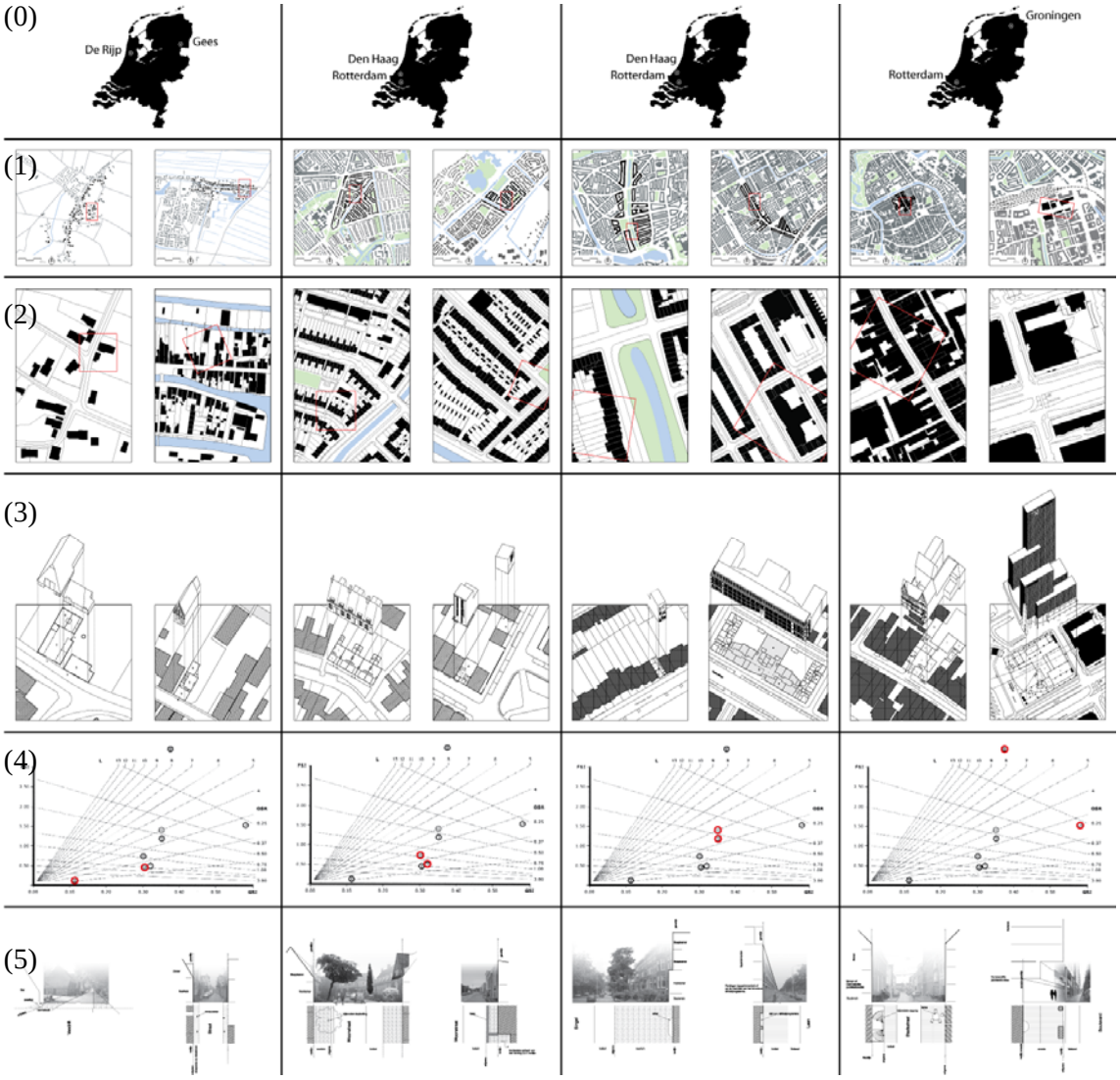


Figure 18. Overview of drawings on the five elements of the urban grammar. From top to bottom: location (0), city plan (1), parcelling plan and block type (2), building type and orientation (3), density (4), and public-private transition and street scene (5). From left to right: Gees, De Rijp, Rotterdam Vreewijk, The Hague Ypenburg, Rotterdam Heemraadssingel, The Hague Vaillantlaan, Groningen Oude Boteringestraat, Rotterdam Weena.

Until now we have not said anything about density, while this element leads to the first important quantitative set of rules. Depending on the type of fabric (or its position in the city plan, corresponding with element 1), there is of course a direct relationship between the parcelling plan (element 2) and the density (element 4). In this research the so-called Spacemate-graph was used to show the correlation between the density variables FSI, GSI and OSR.[9] Because these variables make use of the same data (floor area, footprint, terrain area and number of layers), they can be shown in one graph, with the FSI on the y-axis, the GSI on the x-axis, the OSR from the upper right corner to the lower left corner, and the number of layers (L)

[9] Berghauser Pont, Haupt 2004; see also: Berghauser Pont, Haupt 2010.

from the lower right corner to the upper left. Because of this, every fabric has a unique position in the graph, while fabrics with the same level of urbanity show up next to each other. As can be seen in figure 18 the FSI rises from fabric to fabric, while the OSR decreases. In other words: the parcelling plans become more 'black' from left to right. The GSI also rises from left to right, with the exception of the very wide and empty Weena in Rotterdam (but with very tall buildings, thus the extreme FSI). Another exception to the categories of the urban grammar is the fishing village of De Rijp: in the graph its density is more similar to a suburban area than to a village. As said above, this almost urban atmosphere is caused by the formal building line and the corresponding street scene.

This remark leads to a second group of rules, on the relationship between the public-private transition and the street scene (element 5) on the one hand, and the building type and its orientation (element 3) on the other. It seems that in fabrics with explicit transition elements like front gardens (Vreewijk, Heemraadssingel), setbacks (Ypenburg, Vaillantlaan) or stairs (Groningen) the orientation of the buildings is more to the front side, while informal or collective transition zones lead to a possible backward orientation (Gees, De Rijp (behind the formal façades). Here The Hague Ypenburg and Rotterdam Weena are special cases, because in those examples the buildings have a double orientation or they are closed to the public.

A third set of rules can be distilled on the relationship between parcelling plan or block type (element 2) and building type (element 3). Depending on the type of urban fabric, the size of the blocks (or the private 'islands' within the network of public spaces) increases from left to right. At the same time we see an increasing fragmentation in the blocks and the parcels in the opposite direction: the inner cities have very large buildings or ditto closed blocks (with a lot of informal routes in the old inner city of Groningen), in the urban examples we see formal closed blocks, the suburban cases have a more fragmented block, with collective space on the inside, while the villages have the most fragmented structure.

Finally we have found rules on the relationship between the block type (element 2) and the street scene (element 5). Especially in the four fabrics in the middle of the scheme we can see interesting implicit and explicit rules for the composition of the building block, with different effects on the street scene. These effects do not follow the categories of the urban fabrics, but they are being determined by the focus of the designer: in the Rotterdam cases this has been mainly on the public space (different types of trees and different types of public spaces) and in the The Hague cases more on the architecture (different kinds of explicit rules). In the last two examples this has led to a very strictly controlled street scene with less flexibility.

Conclusion

This article has shown a comparative research on different urban fabrics, in order to learn more about the relationships that form the 'urban grammar', as a toolbox of explicit and implicit rules. Based on this research we can conclude that it is important for urban designers to investigate the urban grammar and experiment with it, before a design is made. When an urban design has to be made within the context of an existing city or village, it is essential that the urban designer understands the grammar of this context. This knowledge is necessary for a contextual as well as for a contrasting design, because you have to know how to mingle in or how to oppose. It is even important for a design without any context, because in that case the designer has to build his own grammar, based on existing rules.

This article has shown which elements could be studied and how these elements interfere with each other, with as most important relationships the one between parcelling plan and density, the one between public-private transition and building type or orientation, the one between parcelling plan and building type, and the one between public-private transition and block type. By studying these 'grammatical' relationships we can obtain starting points for new designs that are able to communicate with existing urban fabrics.

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MaartenJan Hoekstra (1975) studied Architecture and Urbanism at the Delft University of Technology, and Dutch linguistics at the Leiden University and the University of Amsterdam. Since 1999 he is working as a researcher and a teacher at the Department of Urbanism of the Faculty of Architecture at the Delft University of Technology. He is co-author of several books concerning the fundamentals of Dutch urbanism. Since 2011 his main focus is on his PhD research regarding the terminology of urbanism.