Future Community in Istanbul

**An interpretation of Istanbul to generate a new urban life**

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Abstract. The parametric design techniques are developed over the past 15 years. And a new style called parametricism is born, which is the style rooted in digital animation techniques. The parametricism is based on the advanced parametric design systems and scripting method (Schumacher, 2009). This study is the research of defining the city of Istanbul and the skyscraper together in the sense of the parametricism. The result is expected to be a self-sufficient urban living proposal by using generative and parametric tools and scripting techniques. The other purpose of this study is to examine the relationship between the skyscraper and the natural world, and the urban living.

Keywords. Skyscraper; Istanbul; Banyan tree; upwards and downwards growth; shape grammar.

General

The intention of Istanbul’s built environment is to go upwards since it began to develop. The geographical structure of Istanbul has 7 hills. The empires built Maiden’s Tower, the mosques with minarets, Galata Tower in the early ages. In the 20th century, the skyscrapers began to appear and they keep on being built. It is easy to perceive this upwards movement, especially by the silhouettes of Bosphorus and 4.Lev-ent-Maslak areas. The more the prestige among the firms get important and the less the city’s unused horizontal areas are left, the higher the buildings get. The sky is being scraped over and over again, each time more deeply.

The vertical life has become more important than the horizontal life due to the modern living. It used to be different than today. Along with the upwards movement of the built environment, the individual living and working in the city have moved to upper layers. In spite of this, the public life that people share in the city still exists on the lowest horizontal direction. People go up to be one and go down to share and become more. Figure 1 shows the vertical movement in the context of the use of skyscrapers.

On the other hand, Istanbul is not just a city of function. Istanbul has an enormously huge memory of the past. Old and new, past and future. All of them are together in one organism. The present and the future are fed by the past. Istanbul does not deny the existence of its history. Furthermore, it embraces the past while moving ahead. As Lukez (2007) agreed that examples of time-layered sites reveal how the unique quality of a place emerges out of the interaction of place and time, such that people can postulate that the identity of a community emerges from
The successive operations of transformation on a site over time. This situation helps to form a new identity continuously. The new being includes the properties of all the past moments. Being the capital of the 3 big empires leads Istanbul to have many cultures. The layers of all these times are collected to generate a new time section of Istanbul for the future.

**The Inspiration**

A main formation would be coming out from one body and creating other sub-formations. The Banyan tree, which symbolizes the cycle of a life with the past, present and the future, inspired the geometry and form. They grow into thick woody trunks which, with age, can become indistinguishable from the main trunk (Figure 2). Old trees can spread out laterally using these prop roots to cover a wide area. This gives multiple possibilities of a growth, first upwards, then downwards.

This idea of a growing tree leads the way to the ingredients of a trunk. Growth rings can be seen in a horizontal cross section cut through the trunk of a tree. The new rings do not destroy the old ones. Both can survive. Without the old rings, the new ones would be meaningless; and without the existence of the new ones, the old rings would not be old. This shows the importance of “old becoming something new”.

The inevitable result of the idea of a skyscraper and the crowdedness of the city in the future is a mega structure, which would provoke the high-vertical living (Figure 3). This new, provoking structure would be formed by the growth rings, which include the function segments such as the residential and commercial area, social and cultural activities, agriculture spaces and technical and ecological support.
units. First, the mega structure, that includes all the segments, would be generated going upwards over the existing city. A new, wide area on those upper levels would serve as a public space for the whole community. Then, as time passes, according to the need, the function segments would be added. Unlike Lukez’s (2007) words of Addition of material is outward of upward from the original form, these function segments would grow downwards along with the general upwards movement. A new community proposal, a new interpretation of Istanbul, where the roots would become the new bodies, is presented in the context of this research.

The Generation
There are 5 main functions, which are residential, commercial, retail, agriculture and public space. Every function is symbolized by 9 meters by 6 meters rectangular cells. It was offered 8 different rule sets to combine all the functions by obeying their connection rules. Every rule set combines 15 different combinations of the function cells. The rule set combinations are generated so that more space can be provided for the community, when the population increases. Lukez (2007) agrees by mentioning that “This process of searching for the form of a place creates opportunities for individuals and their institutions to ‘dwell’ in their environments, thereby allowing individuals to orient themselves spatially and temporally relative to larger societal forces.”

Since 1977, Stiny’s paper about generation of Chinese lattice design shape grammars have been used to understand the design language, to analyse a design or a shape and to generate new designs from the same language. The shape grammars are a rule-based design method, which helps to solve the rule schema of a structure of a design. The shape grammar model helps to understand the design language of the whole system, generate new ones and transform the existing ones (Stiny, 1980).

The shape grammar of the cells creates different and numerous combinations of functions. Residential area can be connected only to the commercial area, the public spaces and the agricultural cells while commercial area is being linked to the public space and the retail function on the same level (Figure 4). Each cell can also be connected by itself.

The Figure 5 shows the combinations and relations between the functions. First two rule sets show that the relation between the horizontal cells, the 3rd and the 4th rule sets are creating the combination of the one horizontal and one vertical cells, and the next two rule sets, the 5th and the 6th ones generate the combination of 2 vertical cells at the corners. The 7th and the 8th rule sets show the connection rules of the cells on the edges.
Figure 4
The relationship of the functions.

Diagram showing the relationship between different functions:
- Agriculture
  - Cereals
  - Meat Eggs
  - Veg. Fruit
- Residential
- Commercial
  - Offices
  - Apart Hotels
- Public Spaces
  - Open Space
  - Cultural Activ.
  - Cafe Rest.
  - Entertain.
- Retail
  - Stores
  - Bazaars
  - Shop. Cent.
  - Markets
Figure 5
The rule set of the shape grammar generating the level layouts.

Figure 6
The formation of units.
For closing the connection ring, which creates the form of the floor plan, it must be containing every function, which means on every floor there must be residences, offices, farms, public spaces and shopping centers. Figure 6 gives information about the combination in different number of cells and the formation of the floor plan that will be used in scripting phase.

With the generation of the shape grammar many different plan schemata can be created. After the generation, the frames of the floor plans are drawn and converted to the closed curves with the help of Rhino scripting. The first script converts the rectilinear contours into curvilinear forms. Changing the number of the dividing points creates the inner curves alike the growth ring of a tree. The second script copies the inner and outer curves upwards and downwards changing the scale of each curve (Figure 7).

The floor plans of the different towers are connected to create the huge core of the new urban life. The form of the core is also converted to the closed
curve. The top floor, which is the growing source of all the towers, whether upwards and/or downwards, is the main public space that is proposed as the new city life above the ground. In Figure 8 it can be seen the proposed urban living in the existing city.

This new community would be self-efficient. The vertical cycle of the life would also be the cycle of the energy. The consumption and the production balance would be provided by this new proposed life with the energy production system usage. As it is seen in the Figure 9 when the need of a function occurs then every plan can develop at the inside or outside corners downwards. This evolution can be interpreted as a self-sustained city form in a utopia. The most important point is that the connection with the existing city is never broken, but the proposed new urban living never consumes the resources of the present city.
Figure 10
Production-consumption balance.
Conclusion

Lynch (1998) states that the form of a city or of a metropolis will be a complicated pattern, continuous and whole, yet intricate and mobile, and the environment should speak of the individuals and their complex society, of their aspirations and their historical tradition, of the natural setting, and of the complicated functions and movements of the city world. The complexity of an individual and the society would keep on existing. The future cities that let them inhabit would have to be formed including all the factors that Lynch (1998) stated. This proposal opens a new perspective for the idea of a sustainable community. It studies adaptation of the future cities according to the continuous changes by using the properties of the site (Istanbul), a shape grammar model and principles of a Banyan Tree.

References

Stiny, G 1980, 'Introduction to Shape and Shape Grammars', Environment and Planning B, 7, pp. 343-351.