

ASSOCIATIVE DESIGN TECHNIQUES IN SUSTAINABLE ARCHITECTURE

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Summary

The aim of the research is to project new urban neighborhood model for Chinese urbanization. This model wants to overcome the homogeneity of social income groups and its subsequent forms of ghettoization. The neighborhood is designed as a growth model. The potential of the structure is tested by the organizational potential to allow public program to emerge overtime.



Fig. 1 Urban homogeneity, Shanghai

Associative design research proposes an oppositional idea of typological thinking, what in biology is called, population thinking, a design approach of pure variations whereby a group of objects or a family of building will be differentiated in various degrees and kinds. Associative design is a parametric design technique using metric parameters to create an infinite number of variations.

Keywords: Parametric design, Associative design, Simulation tools, Vernacular architecture, Sustainable architecture, Chinese courtyard houses

1 Chinese vernacular architecture

In order to better understand urbanization and architecture in China, vernacular architecture was studied at first. It was concluded that throughout the evolution of these historic Chinese courtyard houses, their urban appearances and its morphogenetic process have been accommodate by a system of associativity from the scale of the smallest manufacturing component to the scale of the urban environment. In each scale level new external forces affect the internal constraints of the geometrical model.

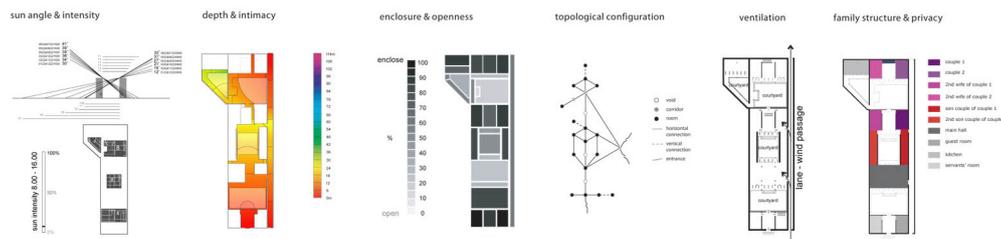


Fig. 2 Courtyard house in Jiangsu - analyze

In the case of Zhu Jiao Jia’s canal town vernacular, the manufacturing process of the roof tile effects the structural system, which is transformed by programmatic use and grows according to social organizations and their subsequent demands. The repetition of the courtyard houses is organized along the country’s water infrastructural systems and its variation is articulated differently within each village. The knowledge produced by this morphogenetic process was taken as the material knowledge on which the further research was based on.



Fig. 3 Vernacular courtyard houses, Jhu Jiao Jia

2 Synthetic Vernaculars

2.1 Hypothesis

In the vernacular residence of Shanghai region, the ambiguity of environmental characteristics which results from the hierarchical layouts of void spaces has made a fascinating living experience.

There's no clear distinction in the functional definition of public spaces, nor is there a private or public description, but the space itself is a powerful container, that allows the emergence of certain kinds of activities and encounter of certain people.

In the current housing market in urban China, standard housing around 90 sqm which can easily be accepted by the market is requiring for huge developments. The suburban location of the project became also an opportunity for exploring models on 90 sqm houses. However the precious living quality of the vernacular exists neither in the housing units nor the more general neighbourhood scale.

The intention of this project is to learn from the spatial organization of the vernacular models, aiming at exploring possible model of modern Chinese living and offering alternative strategy for middle income people.

2.2 Housing unit

The analysis of 90 sqm standard plans suggests a potential in the core living area where a void space can emerge. If we take the square meters of the balconies out and relocate the plan into a 100 sqm unit with respect to the preferable way of room arrangement, a sky well can then find its position.

However the form of the unit varies, the sky well is in-between the more active living space and relatively still zone, generating a rich package of room arrangements that can offer options to people with different social status and preferences. In comparison to the existing plan in which lighting is only accessible from north and south, the sky well performs well physically in both lighting and ventilation. But more importantly, the total privacy of the space changes dramatically the way of living.

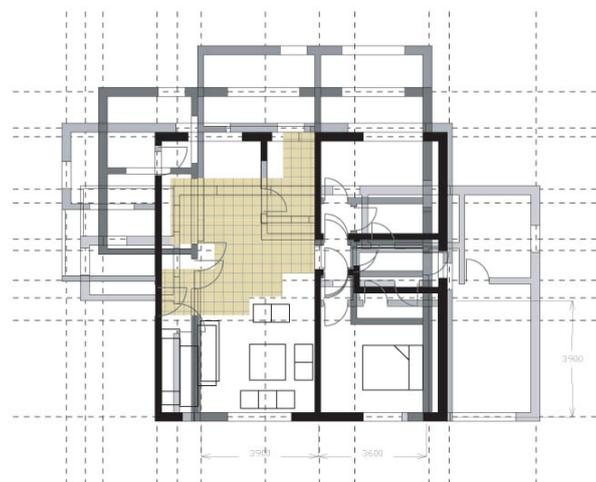


Fig. 4 Housing unit, parametric model



Fig. 5 Housing unit, variations

2.3 Housing cluster

A public courtyard can be created by the composition of two pairs of units. The dimension of the courtyard is defined by sun regulations and perception of the space itself. All the courtyards are diversified by the amount of units, the number of exits, and the sizes of the courtyard. The characteristic of each courtyard is generated by shifting the position of the housing units.

As the size of the courtyard space varies, the number of exits also changes. Different programs in relation to certain requirements might emerge with the location of the cluster. A cluster with 2 pair of units can accommodate local function while a bigger one serves more as a public assembly.

The repetition of courtyards results in different junctions and street patterns. These street patterns can be specified through local controls on road bifurcations and exits, generating either hierarchical or equal connections within clusters. Junctions of ‘x’ or ‘t’ can trigger interactions. Street patterns as “linear” or “tree” defines the accessibility and collectiveness of each shared courtyard.

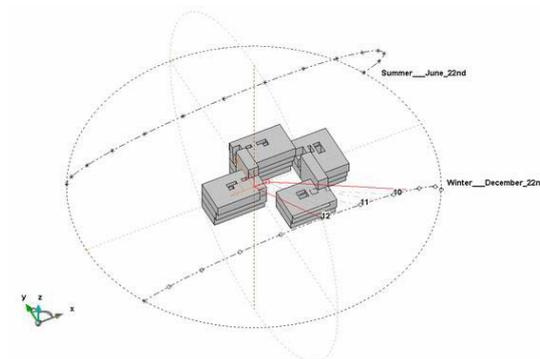


Fig. 6 Housing cluster, parametric model

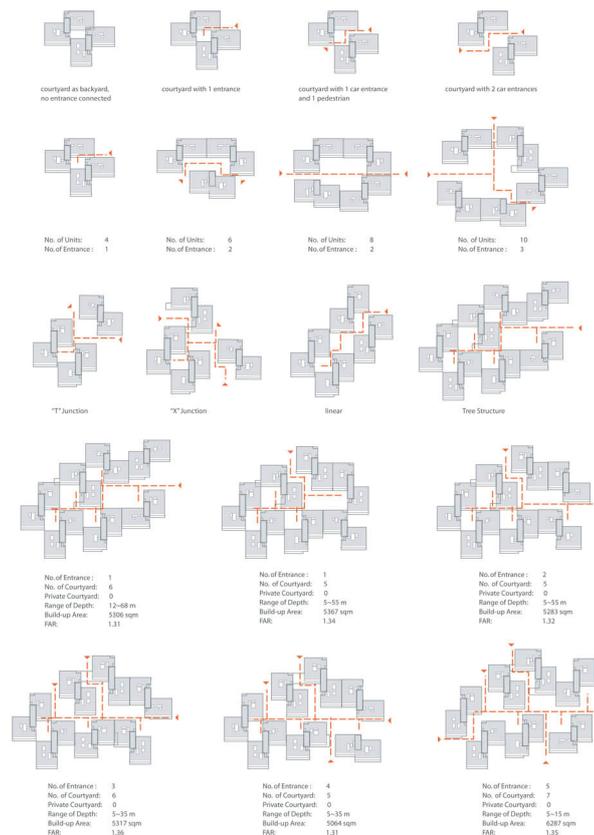


Fig. 7 Housing cluster, variations

2.4 Neighborhood model

According to the Chinese housing regulation, one of the main forces driving the planning is the distribution of programs. In opposition to the existing top-down assignment, a program-guided system is established. Each program requires different conditions in terms of land use, ground areas, location and specific preferences due to the domestic behaviours. In case of programs requiring for larger volumes, units of one cluster can be combined and the courtyard turns them into a semi-public space. Therefore, the size of the courtyards always adapts to accommodate different programs and reveal certain kinds of situations that may emerge.

As the amount of housing units increases, new programs emerge to meet the local demands. Once the service radius reaches its limit, a local-centre is formed and then comes a new population. The further the growth continues, more complex the hierarchy of program centrality gets. This process continues until the neighbourhood is populated. The morphological process performs in such an evolutionary way that it's never a simple repetition of courtyard arrangements, but an associative relationship with one affecting the other. It provides a basis upon which programs in different domains and locations can be correlated and made to reinforce the vividness of the living environment.

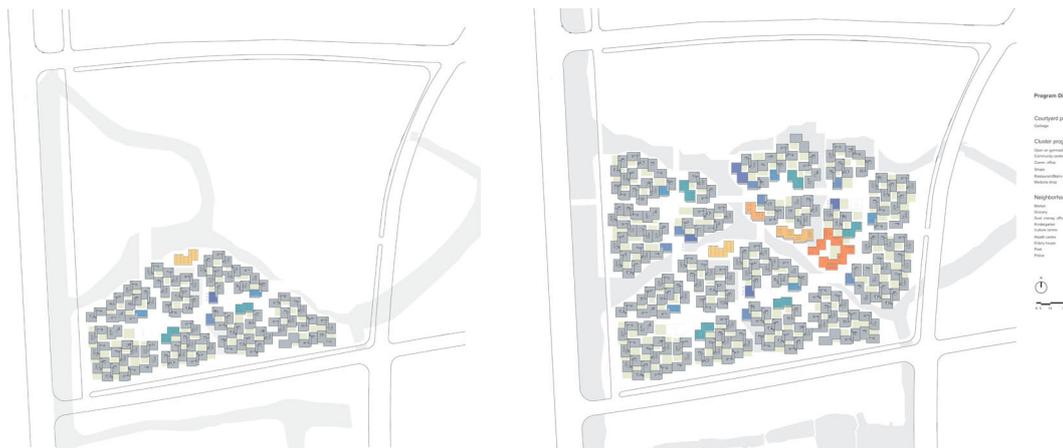


Fig. 8 Growth model

The occupation on site is the application following the logic of programming regarding of the ground condition. A pair of housing units takes south-west corner of the crossroads. The next units appear and form the collective courtyard. Only one car exit is left to ensure its privacy. The infrastructure emerges when it goes on and certain depth of the courtyard is created. Since each unit has to be also easily accessible, a pedestrian path on a more collective level appears after the population of 8 units. Similarly, motor way appears.

3 Conclusions

The masterplan comes out as a result of negotiation inbetween environmental, political, social, and economical factors. The new neighbourhood is decentralized into a mass of islands divided by the existing canals, and connected with infrastructural and programmatic public spaces. Each island sustain itself with domestic facilities while some of them serves also the general, which differentiates all the individuals by degrees of intimacy and physically, the perception of spatial characters. The infrastructural configuration of the neighbourhood displays a network of different degrees of intimacy.

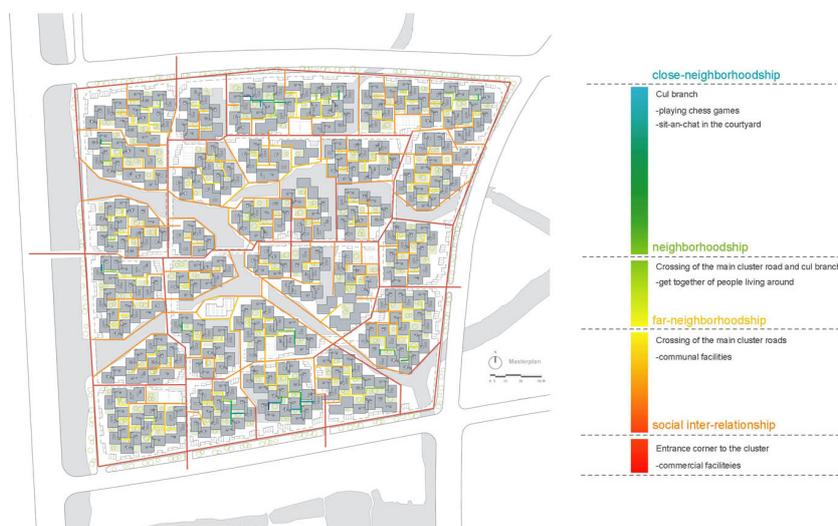


Fig. 9 Evaluation of the street pattern

The programmatic use of public spaces reflects similar performance as the Li-long neighbourhood does. Road linkage to all the islands are mostly occupied by the inter-social programs such as retail facilities. Communal facilities possess the main crossings, encouraging a dynamic population flow. Secondary road junctions with concentrated population flow and at the end of the branches, only close-neighborhoodship happens.

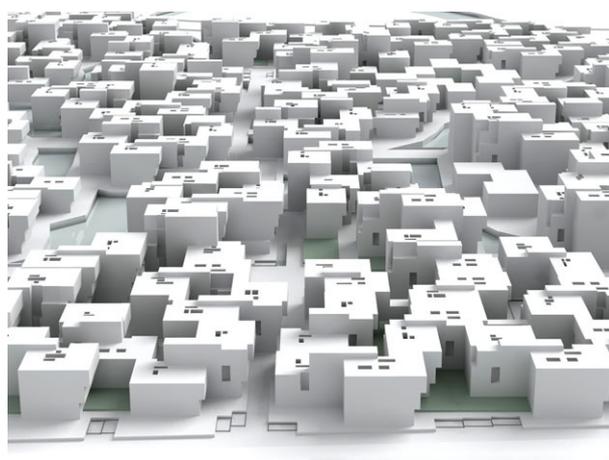


Fig. 10 Final neighborhood model

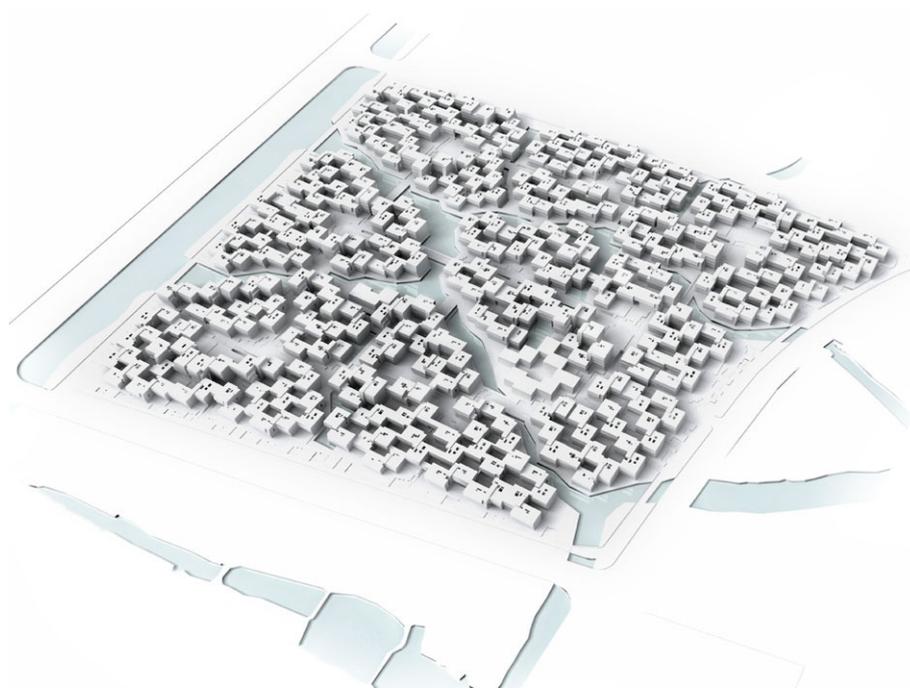


Fig. 11 Final neighborhood model

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