INTERVIEW WITH PETER TRUMMER

typology and population thinking

Etien Santiago

Santiago: *What is a "type," and why should it concern architects? What role does typology play in architecture today?*

Trummer: Probably one of the major reasons for our long-held refusal to address typology is, as Rafael Moneo stated in 1978, that doing so would force us to face much greater questions. In his words, "To raise the question of typology in architecture is to raise a question of the nature of the architectural work itself. To answer it means, for each generation, a redefinition of the essence of architecture and an explanation of all its attendant problems."[1]

Yet after nearly two decades of their notable absence, we are now witnessing the rebirth of typological debates in architecture. For example, FOA—composed of Alejandro Zaera Polo and Farshid Moussavi—wrote an entire book around the idea of *phylogenesis*, and the Architectural Association in London recently published a book on typological formations, specifically relating to renewable building types in the city. While I fully weigh the importance of Moneo's remark, I would like to raise the exact opposite question: instead of asking how to interpret the idea of typological thinking in architecture today, I would like to ask how *population thinking* can change the nature of our architectural work.

This question might sound like a completely new one, but in truth it is not. The aim here is to continue a debate that began in the late 1980s and went on into the early 1990s, one that effectively started a process that would subsequently erase the idea of typological thought within the discipline of architecture.

What does it mean to think typologically? In its most simple instance, we can define typology as a concept that describes a group of objects characterized by a certain formal structure. This structure is the group's "essence," or the features that all of its entities share and that make each one resemble the others. So we can say that thinking in typologies roughly means thinking in species.

Now what does this mean for architecture? On the one hand, architecture is like any form of art: it produces unique, singular objects. Their uniqueness places them at a certain moment, in a particular place, and responds to very specific demands. On the other hand, even a work of art can be seen as a practice that belongs to a class of repeated objects. From this point of view, architecture can be seen as a practice that repeats generic attributes—such as the "hut," or the "arch" of stone construction. Therefore, as Moneo says, to think about the question of "types" is to think about the very nature of architectural work, or how it goes about approaching its problems.

1 *Rafael Moneo, "On Typology," Oppositions 13 (Summer 1978): 23.*

Santiago: *What are the historical precedents for thinking about "types' in architecture?*

Trummer: To respond, we should go at least as far back as Quatremère de Quincy, whose ambition was essentially to help architecture reconstruct its link with the past. For him, it was absolutely necessary that this link remain constant throughout history. De Quincy hoped to explain this continuous link between one architectural object and another through architecture's social and cultural relevance. He wanted to present architecture as a coherent system of creation and to construct a theory of the originating principles from which it is born. His approach to the idea of types, as Sylvia Lavin describes so well in her book on de Quincy, was to radicalize it by secularizing its meaning in order to eliminate Platonic ideas behind the types. In other words, types were no longer seen as coming from God, but rather as coming from man. Therefore, for de Quincy, "type" chiefly expressed an abstract notion of historical continuity in the architecture produced by man.[2]

For example, de Quincy believed that the evolution from primitive hut to advanced construction paralleled the evolution of primitive society as it moved toward the creation of civilized nation-states. He was essentially arguing that society was represented in its architectural work, and vice versa.

In this way, de Quincy laid the foundation for seeing architecture as a mode of representation. He distinguished between the notion of the "type" and the notion of the "model." While type "is the result not of nature but of an inspired idea and is an act of self-conscious creation,"[3] its application is the model, the endless variations that emerge from one idea.

During the nineteenth century, however, architects seemed to have paid little if any attention to de Quincy's ideas. Instead of thinking in types, they developed models. Jean-Nicholas-Louis Durand was one of the best-known followers of this trend. Although he never used the words *type* or *typology*, he nonetheless became a major contributor to the debate on types.

In manuals and handbooks, Durand presented examples of how past architectural knowledge could be applied to new kinds of programmatic building types, as Nikolaus Pevsner would later call them. In opposition to the type-form problem of de Quincy, Durand's focus was to open a new field of theory, which he called composition.

If we look at the techniques that Durand used to achieve this, he basically proposed that two instruments rule his templates. One is a continuous undifferentiated grid, and the other is an aesthetical axis to support its parts. In order to achieve the specific, he established a generic model of endless flexibility that avoided all constraints.

As Moneo wrote: "Durand's work anticipated the nineteenth century's theoretical approach to architecture: a knowledge based on history as a quarry of available

2 *Sylvia Lavin, Quatremère de Quincy and the Invention of a Modern Language of Architecture (Cambridge, Mass.: MIT Press, 1992).*

3 *Ibid., 96.*

material, supported by an idea of composition, (...) and its principles later finalized in the Beaux Arts architectural system of the last years of the century."[4]

Through his work, Durand established an architectural kind of typological thinking that escaped the theoretical work of de Quincy and that later became the dominant approach of twentieth-century architectural practices. Later he would be criticized by architectural historians such as Werner Oechslin. Oechslin lamented how the discourse of the early 1980s eliminated any intellectual debate on typology. He believed that the cause of this disappearance could be traced to an entrenched obsession with superficialities, which arguably started with Durand.[5]

But a discussion of types reemerged in 1960s Italy, where a group of architectural researchers—most notably Saverio Muratori and Gianfranco Caniggia—effectively engaged and revisited de Quincy's idea of typology as a way to criticize modernism.

The modernists of course rejected the idea of an academic theory of architectural typologies, and eliminated any link to history by claiming that architecture had to offer a completely new language—a new

4 *Moneo, "On Typology," page no..*

5 *Werner Oechslin, "Premises for the Resumption of the Discussion of Typology," Assemblage 1 (1986).*

A quarter-mile section of the raw desert landscape of Maricopa County, Phoenix, Arizona, with its specific vegetation distribution areas, known as 'washes'. These washes evolved out of the seasonal floods within the unconsolidated soil conditions of the Sonoran Desert basins

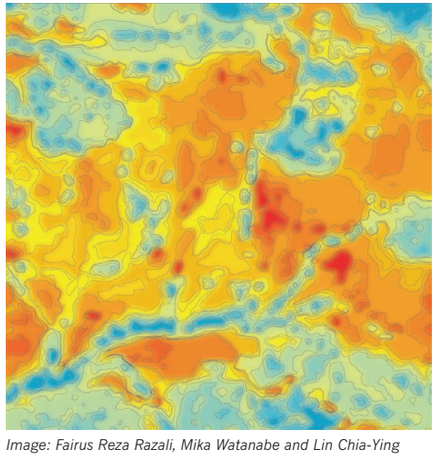


Image: Fairus Reza Razali, Mika Watanabe and Lin Chia-Ying

This diagram visualizes the radiation effect of the soil conditions from the same area. This intensive property of the desert varies with the surface type. In areas with a high density of vegetation, the radiation is low (blue); while it is quite high in the parts that have no vegetation at all (red). This technique of measuring radiation is used to indicate heat island effects within the urban fabric, especially in desert environments.

way to describe physical space. Based on developments in the discipline of physics, architecture effectively became the materialization of space. "According to this notion, the architect's task is to capture the idealized space through the definition of abstract components. Like the physicist, the architect must first know the elements of matter, of space itself. He is then able to isolate a portion of that space to form a precise building."[6] Thus, the idea of "type" that the modernists inherited was cut off from all of its historical references and was translated into architecture as prototypes.

However, it was thanks to the approach of people like Muratori, and later his student Caniggia, that the discussion on typological thinking was once again linked and confronted with de Quincy's early nineteenth-century definition.

In opposition to the blatant ignorance of modernist city planning, Muratori pointed back to the formal and structural continuity of traditional cities. In his *Studi per una operante storia urbana di Venezia*, he examined the idea that the city fabric constitutes continuities among different scales. So, in contrast to the modernists' definition of type, he understood it not as an abstract concept, but as a real element that formed the pattern of the city's growth. He and his pupils labeled "type" as the product of spontaneous consciousness, or the underlying principles of a city's specific layout—a concept that simultaneously echoes and readjusts de Quincy's ideas.

What Muratori did in Venice, and which Caniggia later continued, was to unravel the urban fabric over time. Both architects basically redrew the material organization of the city fabric in order to identify each unit and its specific characteristics. As Caniggia explains, "If we see that two or more houses have similar characteristics, we label them together and say that these two houses belong to the same 'building type.' (...) If I retrieve the elements that I recognize as being similar in a unitary definition, I obtain a statistically derived 'building type': in order words, I see numerous buildings existing of two dwelling stories placed on the top of a ground floor, with two windows per story and with a large door, and a small door on the ground floor."[7]

This methodology clearly led them to identify the features that would lead them to the underlying "house concept," or what they called the "mental map." What Caniggia and Muratori define as a typological process is the progressive differentiation of building types within the same cultural area. To quote Caniggia again, "14th century builders build their houses according to type and house concepts of the time, 15th century builders build their houses according to the concept and type in force during their era."[8] This process of changing house concepts, and their important influence upon what was built, resulted in the individuation of buildings through the typological process.

Thus, the work of Muratori and Caniggia formed strong analogies between the ty-

6 *Moneo, "On Typology."*

7 *Gianfranco Caniggia and Gian Luigi Maffei, Interpreting Basic Building: Architectural Composition and Building Typology (Firenze: Alinea, 2001), 51.*

8 *Ibid., 41.*

pological process of earlier architectural discourses and biological conceptions of "type." The urban fabric of the city was seen as the organism, unfolding out of the cells defined by the individual buildings. By seeing the city not as frozen pieces but rather as a biological process, Caniggia and Muratori actually got very close to the idea of population thinking. For the first time, the specific variations of the city could be seen as very real and important. Ultimately, however, the biology described was nothing more than a figurative metaphor, not a performative model, and Caniggia and Muratori continued to reduce the variations to nothing more than statistical abstractions—all of which decidedly maintained the grip of the typological approach. They were basically trying to find a way to find the essential features that gave identity to the individuation of the buildings, rather than identifying the morphogenetic process that defines the species as a population.

Santiago: *What is population thinking? What are its (biological) origins?*

Trummer: Population thinking is a concept that thinks in species, a term that comes from the discipline of biology. In order to understand its specificity, we should start by pointing out some of the "species concepts" that have until now dominated the discourse of architectural research and practice. The term *species* is used to designate a class or a family of similar things. This term usually describes groups of living organisms, but it also has been used to describe inanimate objects. Physicists talk of nuclear species, mineralogists consider minerals as belonging to certain species, and even books on the evolution of design categorize furniture such as tables and chairs according to species. And this description of organisms, inanimate objects, or animated objects using the concept of species has led to various applications (as well as contradictions) in practice.

Here is an illuminating quote from biologist Ernst Mayr:

> *The assumptions of population thinking are diametrically opposed to those of the typologist. The populationist stresses the uniqueness of everything in the organic world. What is true for the human species, that no two individuals are alike, is equally true for all other species of animals and plants … all organisms and organic phenomena are composed of unique features and can be described collectively only in statistical terms. Individuals, or any kind of organic entities, form populations of which we can determine the arithmetic mean and the statistics of variation. Averages are merely statistical abstractions, only the individuals of which the population is composed have reality. The ultimate conclusions of the population thinker and of the typologist are precisely the opposite. For the typologist the type (eidos) is real and the variation an illusion, while for the populationist the type (average) is an abstraction and only the variation is real. No ways of looking at nature could be more different.*[9]

By describing the difference between population thinking and typological thinking, Mayr is replacing one species concept with another. Providing further support to Charles Darwin's theory of evolution, population thinking went on to become the only accepted species concept within biology. In this way, population thinking must first and foremost be

9 Ernst Mayr, Populations, Species, and Evolution (Cambridge, Mass.: Harvard University Press, 1963), 4.

Another quarter-mile section of desert landscape in Maricopa County, Phoenix, Arizona.

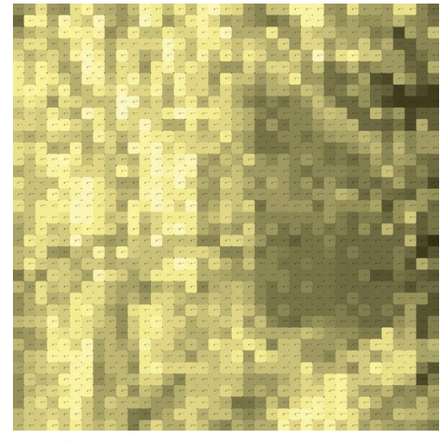


Image: Fairus Reza Razali, Mika Watanabe and Lin Chia-Ying

The image shows the land value, an intensive measure of the economic value of a raw piece of desert landscape based on the current market potential. The value is the sum of various given objectives, with values ranging from 0.1 to 0.5. The objectives are: topography (TC), water retention (WR), existing feasibility (EF), vegetation density (VD), sound comport (SC), precipitation level (PL). Thus Land Value = TC+WR+EF+VD+SC+PL.

understood through the idea of multiplicity. To quote Gilles Deleuze, a multiplicity—in opposition to the idea of typology, which reduces the many into one—"must not designate a combination of the many and the one, but rather an organization belonging to the many as much, which has no need whatsoever of unity in order to form a system."[10]

Thus, population thinking not only replaced typological thinking, but it actually went as far as erasing its roots. In order to more explicitly describe the difference between the two, let us consider two questions. The first is how a group of objects or individuals is defined as a species, and the second, perhaps more important than the first, is how to understand the genesis of forms.

"A species," according to Mayr, "is a group of interbreeding natural populations that are reproductively isolated from other such groups." First, we must note that "it is a protected gene pool, whereby an individual is merely a temporary vessel holding a small portion of the contents of a gene pool for a short period of time." Second, a "species is also an ecological

10 Gilles Deleuze, Difference and Repetition (London: Athlone Press, 1997), 182.

unit that, regardless of the individuals composing it, interacts as a unit with other species with which it shares the environment." Third, "the members of a species constitute a reproductive community."[11]

In order to understand what a population is, or how it differs with respect to other concepts of species, we must understand the way in which it defines itself as a "many." On the one hand, each individual has to be different from the others. At the same time, these differences among individuals must also sustain its identity as a species, compared to other species. Yet it is important to note that without the diversity of the individuals, the whole species could not even exist. And this is exactly what defines population thinking. Each population needs a critical mass of different individuals in order for it to constitute a whole. Unlike typological thinking, which classifies species by morphological characteristics (or different takes upon a geometrical template), a population acquires its identity through its morphogenetic processes (or the forces that drive the differentiation between the individuals). Therefore, the approach of population thinking is radically different from that of typological thinking.

For their part, typologists understand changes and differences in a completely opposite way. In the field of biology, there were at one time two main currents of typological thinking, or two kinds of essentialisms. One was called *transmutationism*, while the other was called *transformationism*. Both of these were based upon a typological approach, but each one had slightly different explanations for how types change throughout history.

The transmutationists believed that change could only occur through the birth of new types. "Since a type (essence) cannot evolve gradually (types are considered to be constant), a new type can originate only through an instantaneous 'mutation' or 'saltation' of existing types, which thereby gives rise to a new class or type."[12] Supporters of this stance, as Mayr explains, saw the world full of discontinuities. While it is difficult to prove that such ideas have been directly taken up by architects, we must nonetheless agree that modernist approaches were defined by a similar kind of understanding. Indeed, who to better demonstrate this stance than Le Corbusier and his contemporaries, all of whom placed faith in the invention of new types as sources of radical mutation, while ignoring the continuous threads of historical (or evolutionary) processes?

While the transmutationist rejected any forms of gradualism or gradual transformation, the transformationist believed in the idea of evolution and developed the concept of gradual evolution. There were essentially two subcategories of transformationism, each of which had a different understanding of what causes changes to occur within a species. One movement of transformationism "postulated that types (essences) are steady improvements of types or essences by intrinsic drives, and that evolution was believed to take place not by the origin of new types, but by the transformation of existing types."[13] In the realm of biology, this theory became known as "finalism."

The second group of transformationists was composed of followers of Jean-Baptiste Lamarck, who saw evolution as the result of each organism's struggle to acquire better traits. For example, the transformationists explained the length of the giraffe's neck not by natural selection, but rather by the neck-stretching practiced by each subsequent generation of giraffes as they strove to reach high tree branches.

I do not know if Muratori or Caniggia even came across these biological theories, but their idea of spontaneous consciousness seems to side with the transformationists. In any case, what is definitely true is that Muratori and Caniggia defined the variations of building types as a process of differentiation due to the environmental forces of a particular period. Spontaneous consciousness defined the form of all the buildings that shared a similar spatial and temporary zone.

By going back to biological concepts, what I want to emphasize here is that architectural thinking is always, in one way or the other, affected by a much wider production of knowledge. I am not trying to prove that architecture copies or literally applies knowledge from other disciplines. Instead, I would like to demonstrate how ideas of other disciplines "became originated in architecture," as Jeffrey Kipnis likes to say. We should not forget that all of our ideas and knowledge emerge out of the same pool of genes—to use a scientific expression.

Santiago: *How can population thinking contribute to architectural research?*

Trummer: Of course it is very difficult to apply population thinking literally to architecture, since architecture is not composed of a set of interbreeding individuals. In order to re-originate the idea of population thinking within the discipline of architecture, I would like to show how we can learn from its genesis of forms and its understanding of matter not as a static entity but as a dynamical process. The reason population thinking has something to offer architecture is not because it "deals with biological taxa, but because the definition is biological."[14] It is within this frame of mind that we can ask what a biological species concept can contribute to our understanding of forms.

Since the early 1990s, there has clearly been a massive influx of knowledge from other disciplines into the discipline of architecture. People like Sanford Kwinter, Jeffrey Kipnis, and Greg Lynn especially have noted this. Today we know that "the dynamical potential of interacting systems that can process information, such as biological molecules, cells, or organisms, emerged (in the 1990s) as a new theory of dynamical systems collectively referred to as sciences of complexity."[15] This understanding formed the paradigmatic shift from essentialism, with its ideas of types, to the understanding of identities produced by the morphogenetic processes. It is this shift that Deleuze wrote about in his ontology of difference.

11 *Mayr, Populations, Species, and Evolution, 21.*

12 *Ernst Mayr, What Evolution Is (London: Phoenix, 2002), 85.*

13 *Ibid., 89.*

14 *Mayr, Populations, Species, and Evolution, 12.*

15 *Brian Goodwin, How the Leopard Changed Its Spots: The Evolution of Complexity (London: Phoenix Giants, 1994), xii.*

In order to originate population thinking into architecture, we must understand how biology explains the morphogenetic process of the concept of species, beginning with Gregor Mendel's ideas of the genotype and the phenotype. The distinction between the phenotype and the genotype is that the "genetic material itself is the genome or genotype, which controls the production of the body of an organism and all of its attributes, the phenotype. This phenotype is the result of the interaction of the genotype with the environment during development. The variation of the phenotype produced by a given genotype under different environmental conditions is called its norms of reaction."[16] To illustrate this point, Mayr points out a simple example: "…a given plant may grow to be larger and more luxurious under favorable conditions of fertilizing and watering than without these environmental factors. Leaves of the water buttercup (*Ranunculus flabellaris*) produced under the water are feathery and very different from the broadened leaves on the branches above water."[17] So it is the phenotype that is exposed to natural selection, not the genotype. This distinction between a mortal body and an immortal transmitter of hereditary instructions is exactly what revolutionized biology.

After understanding the difference between genotype and phenotype, the logical next step is to study morphogenetic processes, or the ways in which differences come about and develop. When applied to vertebrates, this is the work of embryology. Its job is to define the genesis of form and the process of unfolding that an organism goes through to result in the creation of "differentiated tissues and organs."[18] This unfolding is called "progressive differentiation." As Manuel DeLanda astutely points out, "If we were to replace the essences as the explanation of the identity of material objects and natural kinds, we need to specify the way in which multiplicities relate to the physical processes which generate those material objects and kinds."[19]

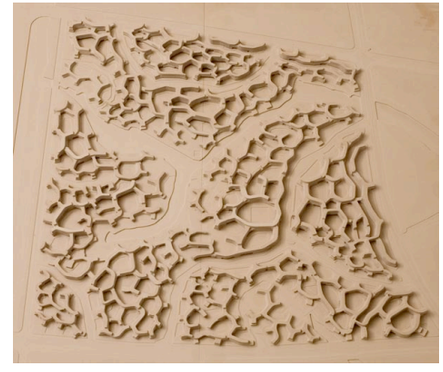
So before we can discuss population thinking in architecture, we must look at how such processes of progressive differentiation can be defined by physicalities, by their metrical and non-metrical properties. Only when we understand differentiation as a means of materializing objects can it make sense to introduce this discourse into architecture. So how do things materialize through the forces of their environments?

Let us take water. Given its appearances, it can occur as either a gas, a solid (ice), or a liquid, depending on the external influence—which, in the case of water, is temperature. As Brian Goodwin says, "If you hold a crystal, made out of carbon, it could take the shape of a diamond with its beautifully regular tetrahedral form. But it could be graphite, whose hexagonal sheets sheer off as it is rubbed over paper."[20] So it is important to remember that any one substance can occur in many forms.

16 *Mayr, What Evolution Is, 98-99.*
17 *Ibid., 99.*
18 *Manuel DeLanda, Intensive Science and Virtual Philosophy (New York: Continuum, 2002), 16-17.*
19 *Ibid., 13.*
20 *Goodwin, How the Leopard Changed its Spots, 9.*

This type of understanding, which Goodwin illustrated with a chemical property, can also be found in the discipline of geometry. Look, for instance, at an example given by DeLanda. To define groups of geometrical objects through progressive differentiation, he says, "we need to consider groups whose members are not objects but transformations…. If we perform, for example, a set of rotations of 90, 180, 270 or 360 degrees on a cube, an observer who did not witness the transformation would not be able to notice that any change had actually occurred." He continues, "On the other hand, the cube would not remain invariant under a rotation of 45 degree, but a sphere would."[21] In mathematical terms this means that a sphere has more degrees of symmetry under a set of rotating transformations than a cube. This kind of approach to organizing differences between entities is radically different from that of classifying objects by their essences, since the latter looks at only the set of properties that all cubes share and not the effects of transformations upon them. It is this process of differentiation that is the underlying principle of Deleuzian philosophy as it pertains to the ontology of difference. Deleuze states that everything, when repeated, only appears as pure difference. This accounts for our metrical properties, like the sections of a cone that appear differently between one instance and another. At one moment it appears as an ellipse, at the next as a parabola, at the next as a hyperbola, and finally as the form of a line. Deleuze pushes his conclusions even further, effectively demonstrating that this can also be applied to all non-

21 *DeLanda, Intensive Science and Virtual Philosophy, 18.*



Top: Projected neighborhood model for Jua Zhu-Jia-Jiao in the wetlands of the Jiangnan River Delta in Shanghai. The intensive properties of the site determine a population of housing units. These units vary in size, organization and degree of collectively shared spaces in accordance with the vagaries of market demands.

Bottom: Another projected neighborhood model. The intensive property of accessibility determines a population of courtyard environments with different degrees of public-ness. These range from offices spaces to local facilities, all designed in relation to infrastructural access points.

metrical properties, demonstrated by the appearance of languages as a process of progressive differentiation of phonological systems. What we can state here is that the re-origination of population thinking in architecture can occur as a process of differentiation of our metrical properties of space, such as lengths, widths, heights, surfaces, and volumes—all of which are extensive properties of the built environment—under the influence of our non-metrical properties of space, defined as degrees of temperature, pressure, tension, and potential differences and capacities—or the intensive properties of our environments.

So what if we were to understand architecture not as typologies or types, which progressively transform from the primitive hut to the complex construction or which exist as spontaneous consciousness, but rather as a population of material organizations unfolding along the relationship between the metrical properties of building materials and the non-metrical properties of their embedded environments?

Let us examine, for example, the traditional Chinese courtyard house. If I were a typologist, I would define the features that characterize its identity by its essences. This means that I would define the courtyard house as a house with a courtyard in the middle.

On the other hand, how would I understand it as a populationist? If we look at all of the variations of Chinese courtyard houses, we can see that each of these houses forms a completely different organization. Houses in the north are organized as individual housing units arranged within a framed landscape, while houses in the south take the organization of a compact block with vertical wholes of different sizes. Once we have realized this, we must now try to identify what drives their morphogenetic process as a population of houses.

I would answer that each of the houses forms a material organization that becomes actualized by three kinds of external forces: the structural, the climatic, and the social. Indeed, the most obvious influence on the layout of the houses is the climatic one. Each house works either as a heating or as a cooling machine, depending upon the climatic condition. The sun penetration in the north is important and presses the layout toward the creation of freestanding heat islands. In the south, the whole house acts like a cooling machine, as both of its pieces—one larger than the other—create air circulation through the pressure differences generated by the different temperatures of the skylights. At the same time, the internal organization of the circulation informs the social distribution of family structure and formalities through its range of possible depths and paths, and by deploying various kinds of intimacies. In this way, the materialization of each of the houses is embedded within the structural performance of its framework. In opposition to the idea of repetitive standards, the Chinese have developed throughout their history a building system that performs according to the associativity of its parts. This structural system is based on rules of relationships between the various wooden components and formal geometries, which today we would call a parametric design approach. For example, in this kind of approach, a change in the diameter of the wood used to construct the house reorganizes the entire structural system.

We thus could call the Chinese courtyard houses a population of material organizations, differentiated by the performance of the structural system through its metrical properties and by the ecological forces through its non-metrical ones. It is perhaps the earliest known architectural practice based upon associative geometry applied over various scales.

Through a technique based on associative geometry, using metrical parameters to create an infinite number of variations, we can re-link the various regimes operating in the construction of urban environments into a mode of interdependency. But in opposition to conventional urban planning, an associative protocol generates at each scale degrees of freedoms that allows each one to become specified within the next scale. Each neighborhood or urban agglomeration is specific to its environmental forces, but they also can vary or take different forms as a result of the decision-making processes between the various scales and the manufacturing process they are based on. To re-originate knowledge from other disciplines in architecture is not something new, but in the case of population thinking it allows projecting new forms of realities that have not yet been actualized.