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Space, Tectonics and Design
空间、建构与设计

Gu Daqing · Vito Bertin | China Architecture & Building Press

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顾大庆·柏庭卫 著

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Space, Tectonics and Design

前言一 | preface 1

顾大庆 Gu Daqing

本书的内容是笔者和同事于2001至2009年这段时间在香港中文大学建筑学系（2009年更名为“建筑学院”）的一个设计课程。这个名为“建构实验”的课程是“建构工作室”设计教学架构的一个部分。借助于“建构实验”这一教学平台，我们试图探讨一个关于空间和建构的设计方法。为什么要进行这样的研究是有多方面原因的，而其中的一个原因很“中国”。鉴于本书主要面向的是国内的读者，故而这里需要就此作特别的说明。

中国的建筑设计在过去的十年间发生了巨大的变化，延续了几十年的巴黎美术学院（“布杂”）的形式主义设计传统好像一下子衰退了，一种对空间、材料和建造的兴趣正逐渐兴起。这个变化最先于1990年代末通过一批青年中国建筑师的設計作品体现出来，他们的作品引起国内外建筑界的普遍关注。他们或有着海外留学的背景，吸收了国外的新设计思想；或通过自我反省和艰苦的探索，实现了设计思想的更新。但是，这些零星的设计实验得以在一个不长的时间内形成一个流行趋势，在很大程度上则要归功于书籍、展览和互联网等现代传媒的作用。我们现在比以往任何时候都能在第一时间了解到那些一流建筑师的最新动态。从某种意义上来说，我们现在也更容易地去“追随”那些新的形式。那些源自模仿的新形式不免显得有点表面化。我也不得不忧虑这会不会只是以前的形式主义设计方法的一种延续呢？

这些新的建筑形式的出现除了突显现代传媒的巨大潜能外，似乎并没有太多的学术支持。这里特别是指建筑院校通过它的设计教育和学术研究对建筑实践的支持。相对而言，巴黎美术学院的形式主义方法就有着深厚的学术基础。事实上我们的整个的建筑教育体系就是为了传授和发展这一形式主义的方法而建立的，不但通过教育培养形式主义的设计人才，还通过

学术研究来阐述和发展形式主义的理论和方法。但是，如今的建筑教育在这一新趋势中则要明显滞后于建筑实践。现在的情形是实践影响教育，而不是相反。建筑教育的滞后尤其反应在基础研究方面的缺失。基础研究，不是指建筑设计入门课程，而是建筑设计基本问题和基本方法的研究。当然，这类研究往往与基础教育有关，不过我们不可以将两者混为一谈。纵观中国建筑教育过去三十年的历程，教育的规模呈现飞速扩张，国际化程度也逐渐提高，学术研究也不能说不活跃，但是在建筑设计的基本问题和方法的研究方面则几乎是空白。这大概就是当前的对空间、材料和建构的兴趣显得后继乏力的根本原因。基础研究的缺乏导致我们只能模仿，难以创新。这个就是我们所面对的一个挑战。

在建筑学校中的建筑设计基本问题和方法的研究主要借助于设计课程来展开。在“建构实验”这个课程中我们试图解决这样几个问题：界定一套空间、建构和设计的语汇；开展一个以体块、板片和杆件为线索的空间研究；重新梳理模型和图在设计过程中的作用；最后也是最重要的，发展一个建构设计方法。这一建构设计方法的特点是以模型作为设计发展的主要手段。首先，对模型材料的操作产生一个建构的概念，而后运用这一概念来组织空间和形式，再经过多种模型材料来丰富空间和形式的表达，最后通过从模型材料到建筑材料的转换成为可建造的形式。本书将通过教案、要点、练习、研究、设计等几个主要篇章来全面介绍这个课程。我们希望这个建构实验课程以及本书的出版对于中国的建筑设计基础研究能够起到一个抛砖引玉的作用。

This book is about a design course that my colleagues and I developed at the Department of Architecture (renamed “School of Architecture” in 2009) of the Chinese University of Hong Kong from 2001 to 2009. The course under the name “Tectonic Lab” was part of a teaching programme provided by the Tectonic Studio. By means of this platform, we tried to develop a design method in relation to space and tectonics. There are many reasons behind this endeavour, one of them appearing to be very “Chinese”. Since this book is intended for readers mainly in mainland China, I should elaborate this point specially here.

Architectural design in China has been undergoing a dramatic transformation in the last decade. The long lasting tradition of the Beaux-Arts formalistic design seemed to decline gradually, while a new interest in space, material, and construction has begun to emerge. This change was first signalled by the buildings designed by a group of young Chinese architects. However, its popularisation into a national phenomenon within a short period was largely due to the power of modern media. It is true that it has never been so easy to obtain the latest news on leading architects’ work. In other words, it also allows us to conveniently “follow” these new forms without any delay. As a consequence we can sense a kind of superficiality appearing in such works. What I have begun to worry about is that this new trend might be merely the continuation of the Beaux-Arts formalism in another form.

What we can observe behind this phenomenon is that, except demonstrating the power of modern media, it actually gains little support from architectural education through its design teaching and academic research. On the contrary, the Beaux-Arts formalism has rooted

itself deeply in architectural education. As a matter of fact, our whole system of architectural education was built for the purpose of promoting Beaux-Arts formalistic design. Trapped by its formalistic tradition, today’s architectural education falls behind architectural practice. This is obvious particularly in the research on basic design issues and methods. What I mean here is not the foundation course although both are often related. In view of the development of architectural education in China in the last 30 years, there has been a tremendous expansion in the scale of education, an increasing level of globalisation and richness of academic research. However, there is very little achievement in basic design research. And, we take this as a challenge.

The design studio is the best venue for conducting research on basic design issues and methods. Through the Tectonic Lab, we have defined a set of terminologies in relation to space, tectonics and design; conducted an experiment on space based on three space defining elements: block, slab and stick; reemphasised the critical role of design media – models and graphics – in the design process; and the most important, developed a tectonic design method. The method is based on the use of models as the primary design tool. First, the operation of model material generates a tectonic concept; then it is applied to the organisation of space and form, next the use of multiple model materials further enhances the expression of space and form, and finally a built form is achieved through the transformation from model materials to building materials. All these matters will be presented thoroughly in this book in the following chapters: programme, essentials, exercise, study and design. We hope that the experiment of the Tectonic Lab and the publication of this book can be a catalyst for the flourishing of basic design research in China.

前言二 | preface 2

柏庭卫 Vito Bertin

我们在本书中所讲述的内容没有多少是我在做学生的时候就学会的。如果要说的话，那么就是“空间限定要素”这个术语。在苏黎世联邦理工学院建筑系，由勃那德·赫伊斯利教授主持的一年级设计课程的练习中，空间限定要素主要是板片，单片的，也可以是“L”形和“U”形的。这个术语强调在可知觉空间和空间限定要素之间存在一定的联系，通过后者我们才能知觉到前者。这种板片的空间限定要素对应于连续空间的概念，这是现代运动为对抗巴黎美术学院的设计传统而提出的主张。在“布杂”的设计中，空间并不是通过独立的板片，而是通过一个连续的包裹界面来界定的。

很久以后，我在欧洲第一次看到这种旧的、“布杂”的空间类型在当代建筑中被非常清晰和纯粹地来处理是由吉耿和癸耶在达沃斯于1992年设计的库奇纳博物馆。在以后的研究中我陆续发现有很多的建筑师运用和发展我称之为包裹空间的概念。这种旧的空间类型的复活，其中的一个主要的原因可能是对建筑的隔热层的要求，这需要将建筑的体积包裹起来，而包裹空间恰恰与之相配合。

我在选修课中开始与学生一起研究符合包裹空间类型的建筑。后来，我和布鲁斯·隆曼在二年级的设计课中引入这两种空间的概念。在建构工作室中，受到马库斯·卢契尔的启发，我们开始研究三种空间限定的要素，即体块、板片和杆件。最终，有关空间限定要素的类型和空间的类型的研究两者结合在一起，我们确定了要研究空间限定要素和空间类型之间的关系。

连续空间和包裹空间这两种空间类型均有深厚的历史渊源。我们将第三种用杆件限定的空间称之为调节空间。调节空间也有历史先例，但是却没有太多的研究。因而，关于这第三种类型的空间的研究也显得比较困难，不但是对学生而言，也

同样对我们。但是，其中也充满了令人着迷的可能性。

观察在我们的教学中具有非常重要的作用。它让我们可以去发现一个建筑概念。我们认为建筑概念是设计的一个部分，因而是可以从设计中辨识出来。尽管有时候一个设计会有许多与建筑不太相关的概念，但是我们还是应该能够识别其中的建筑概念。这个观点与另外一种设计态度形成对比，即设计的想法来自于想像，正如我们常常听到这样的表达：“我要这样做”。而观察首先需要有一个观察的对象。这就是为什么在我们的教学中我们强调不需要经过一个漫长的准备阶段就直接进入设计的操作。在这个课程中，我们的直接行动就是对模型材料的操作。

从操作入手使得每个学生要直接面对手头的任务，而不需要依赖在设计还未开始之前就有的“先入为主”之见。观察不是生来具有，而是需要学习和练习。我们在观察一个对象时的所见受到我们先前知识的影响。但是，我们也应该有一种开放的态度来发现未知的知识。在我们的教案中，我们提供了许多制作、观察和纪录的循环。通过这些过程，我们来学习如何观察。我们在每个环节对观察的内容、方法和媒介均加以界定，如此使得这些练习的目的更加明确。

强调空间及观察是贯穿整个教案的核心，也是这本书的主线。从这两点出发，我们可以达到一个新的设计境界。

Not much of what we describe here in this book did I learn as a student. But one term – space defining element – stems from that time. In the exercises of the first year programme by Prof. Bernhard Hoesli at the ETH-Zurich, the space defining elements were mainly slabs which could also become L-shaped or U-shaped. The term emphasises that there is a relationship between the perceived space and the built element through which space becomes perceivable. This type of element supports the idea of continuous space, which in the modern movement is a polemic reaction to the space preferred by the Beaux-Art tradition, in which the space is not defined by discrete elements, but by a continuous envelope.

The first time I saw this older type of space clearly and almost purely articulated in contemporary architecture in Europe was in the Kirchner Museum Davos by Gigon & Guyer in 1992. In subsequent studies I found that quite a number of architects work with and have developed what I call enveloped space. One reason for the renewed interest in this type of space could be the need for thermal insulation, which requires a continuous layer wrapping a building, which could easily be supported within this concept.

I studied buildings which were, in my view, based on the idea of enveloped space with students in elective courses and later introduced the two space types in a second year studio together with Bruce Lonnman. In the tectonic studio, based on ideas by Markus Lüscher, we started to work with the space defining elements block, slab and stick. Finally we merged the two in the sense that we tried to clarify the relationship between element type and space type.

The two types have a clear historical background. We call the third type, space defined by sticks, modulated space. It has historical prece-

dents, but seems not to have been articulated and discussed that much. It is therefore more difficult, for students too, but also has fascinating possibilities.

Observation plays an important role in our teaching. It provides an occasion to discover an architectural idea. It is based on the view that an architectural idea is part of the design, and therefore recognisable in the design. Even if there are links to ideas outside the design, there should be traces of it in the design. This contrasts with the attitude of a general idea, something imagined, or even wilful as expressed in the words, "I want to do". Observation requires something to look at. That is why we start with actions which produce results without a lengthy preparatory phase. Our initial action is the direct manipulation of model material.

Starting with actions provides each student with something to work with, removing the dependence on an idea before the design process can begin. Observation has to be learned and practised. What we see when looking at something is influenced by what we already know. But we should also be open to discover something unexpected. Our programme provides many cycles of making, observing and recording. This provides occasions for practice. And we try to support the learning by identifying in each step what to look for and suggest methods and media, which might make it easier to focus.

The emphasis on space and the concentration on what we can observe are central to all phases of the programme and can be traced throughout the book. Through this focal point a bigger richer picture is projected.

x 前言三 | preface 3

Markus Lüscher

当许多年前我最初与顾大庆和柏庭卫相识时，我们都在苏黎世联邦理工学院建筑系克莱默教授的工作室教书。若干年后我们又在香港相遇，我向他们介绍了一个建筑教育新课程的展览，这是我作为客座教授在苏黎世联邦理工学院教授的一个关于建造和建筑的一年级课程。基于我早年与克莱默教授一起教学的经历，我想通过强调以下几个问题，从而将建筑教育推进到一个新的高度。

一个关于建筑教育的课程应该将重点放在建筑学的基本问题上：空间、结构和体积。最基本的生成活动必须是能够在抽象的层面上被发现、观察和探索的，以保证有足够的实验的自由。

学习活动必须是可以用模型来做游戏那样的容易。首先你用模型做些东西，然后你仔细观察，你就会在一个抽象的层面上发现空间。学生应该要享受操纵第三维度的乐趣，归根结底，游戏是最佳的学习方式。

教学不是为了发展一个设计方案，而是为了发展建筑设计的能力，是为了探索建筑，是为了发展概念性思考。对建筑教育的最基本的认识是我们完全没有必要一下子就投入到竞赛中去。每个足球或网球运动员都知道在参与到正式的比赛之前都需要经过基本的训练课程。团队合作和交流比起竞赛来要更为重要。学校与现实的最大区别在于，学校可以提供探索和研究的自由。而在实践的环境中，只有那些最优秀的建筑设计事务所才会享有同样的创作自由。

这些主题也深得顾大庆和柏庭卫的认同，他们决定也在香港中文大学建筑学系的建构工作室中尝试类似的方法，我们称这个设计课程为“建构实验”。

这是一个四周的课程，三周的训练和一周的评图。第一周的任务是通过三种不同尺寸的模型材料——体块、板片和杆

件——的操作来生成和发现空间。第二周的任务是设计一个体积，该体积的不同摆放或成为一个楼房，或一个板房，或一个平房。第三周的任务是用设计的体积来形成邻里空间，即体积之间的空间。这就是2001年我们最初开始这个课程的情形。

以后经过多年的不断发展，该实验逐渐成为一个横跨一个学期的课程。概念的方法、结构的影响，以及空间的生成，这些问题在发展一个设计方案的过程中被有系统地检验。建造、功能活动，以及作为城市环境之一部分的场地，这些实际的问题不断地与空间、结构，以及体积这些抽象的问题相互碰撞，最终形成一个新的设计方法和相关的技能。

这个课程的最新发展是在中国用它来培训实践建筑师以及大学的设计老师，以更新他们的设计和教学能力。这更加证明了由顾大庆、柏庭卫，以及其他同事所协同发展的这个设计课程的重要性。我衷心希望这个团队今后能够在教学、研究和发展中取得更多的成果。

I first met Gu Daqing and Vito Bertin as teachers at the ETH-Zürich, where we were all working with Professor Herbert Kramel. Some years later we met again and I presented to them an exhibition about a new programme for architectural education that I had developed as a guest professor in the first year course for construction and architecture at the ETH-Zürich. Starting from my former experiences in teaching together with professor Kramel, I wanted to put architectural education on a new base, focusing on the following theses:

A course for architectural education should focus on the main aspects in architecture: space, structure and mass. The basic generators should be discovered, observed and explored on an abstract level, assuring the freedom of action for experiments.

Learning should become a game on a playground with models which can easily be handled. First you manipulate, then you observe and you will discover space on an abstract level. Students should enjoy exploring the third dimension. Finally, to play is the best way of learning.

Teaching is not only about developing a project, but it is about training abilities in architecture. It is about exploring architecture; it is about conceptual thinking. The idea is not to first of all participate in competitions. Every football team or tennis player knows that he has to attend training programmes before entering a competition. Cooperation and communication are more important than competition. The difference between school and praxis is the freedom of exploration and research which can be granted at school; in practice you find it only amongst the best architectural teams in the market.

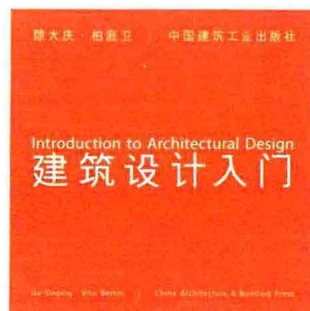
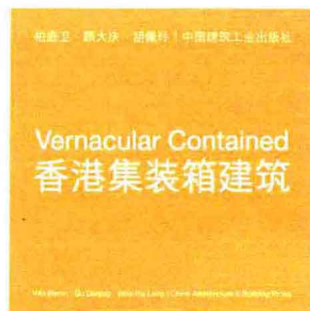
These theses have also been the essence of a new teaching experiment which Gu Daqing and Vito Bertin decided to test at the

Department of Architecture of the Chinese University of Hong Kong. We called it the Tectonics Lab.

The first run of the programme lasted four weeks. The first week for creating and discovering spaces was based on material in the three main dimensions sticks, slabs and blocks. The second week was for developing a volume which can be considered a tall, a thin or a flat object. The third week was for testing arrangements and neighbourhoods, the space in-between objects. That's how the programme started in 2001 in Hong Kong.

Since then it has been continuously further developed into a one-term course for students. The conceptual approach, the structural impact and space as the main subjects have been tested step by step in the process of developing a project. Materialisation, a programme of activities and a site as part of a city context have been confronted with the abstract approach of space, structure and mass and new practices and skills to develop a project have been discovered.

The latest development of the studio is targeted at the direct interest of architectural practice exposing leading staff to a fresh design approach, and is also used in teacher training in China. This attests to the notable quality of the course which was successfully further developed by the team of Gu Daqing, Vito Bertin and a number of persons supporting the exceptional teaching experiment. I wish the team good luck in the next steps of teaching, research and development.



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