QIANHUI LIANG
WORKING SAMPLE
SELECTED WORKS 2011-2016

SMArchS Candidate 2013, MIT
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Vision · Perception · Defamiliarization

The two pictures on the left present extreme example: a circle-shaped hole where space extends beyond the wall. The top one is a moon gate from a traditional Chinese garden, depicting sceneries behind the wall while the other is a mirror from Cluny Blossom's work, reflecting images in front of the wall. The corresponding spatial feelings follow inverse principles.

Similarly, Architecture should be defamiliarized: Form and space is meaningless unless the underlying mechanism is thoroughly discussed. However, if we give tacit consent to the commonplace (the existed result, normative or popular perceptions), we will stop exploring the mechanism behind, which leads to missing opportunities of creation.

Thus, I regard defamiliarization as a generator for design: to question the fundamental basis of architecture problem and start design from preliminary research, to criticize and even run counter to the currentness.

This portfolio reflects my understanding of architecture after six years of study: a process of perception, defamiliarization, retrospect research and design.

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PROFESSIONAL WORK

RESEARCH & SUPPLEMENTS
INTERRELATED COURTYARD

Energy Study and Library Design

Tongji Option Studio (Spring 2016)
The 2016 International Young Architects Design Competition of Major Cultural Facilities in Shanghai, Nominee awards, 2016
Contribution: Settlement Research Strategy/Concept/Prototype Design/Model
Plan Design/Simulation
Instructor: LI Lin, ZHOU Jianjie
Collaborator: LIN Jinghui, WANG Jingkai

The rapid developing LUJIAZUI area in Shanghai represents an exaggerated scale, which is partly influenced by the sunlight regulation in China. Yet huge distances between buildings completely ignore thermal comfort, resulting in over exposed public spaces and facades.

This project critizized this ignorance of interactions between buildings. Inspired by the natural settlements which develop simple but useful morphology adaptations towards climate, this conglomerated library aims to explore new library typology with thermal comfort for snug experiences.
Thermal-Neglected Urban Context

Thermal-environment contrast between the site and nearby old city Suzhou.

Climate conditions of the site

The city of Shanghai is always cited its bipolarity climate of hot humid summer and freezing winter. This peculiar climate is even more explicit in the area of Century Plaza. The exaggerated scale not only jeopardizes the quality of the city space, but also aggravates the urban heat island effect due to the vast uncovered paved surfaces.

There are sophisticated regulations about the minimum hours of sunlight on winter solstices in China, but when rethinking our site, is the complete absence of sunlight shading a real blessing?

Natural Settlements Morphology Adaptations

Unlike artificially planned urban context, organizations of the natural settlements and forms of the units developed adaptations for the local climate, which use some low-tech but efficient principles.
The light strategy is proposed to make use of different solar elevation angles in summer and winter: to capture more light during the winter and to keep out the strong sunlight during the summer. Traditional rectangular courtyards are planned to optimize radiation differences for a comfortable feeling.
Unit Geometric Lighting Optimization

Geometrical operations

- slope
- twist
- stretch

Prototype generation

- 12.21 4:00 pm
- shading
- 12.21 7:00 am
- 6.22 10:30 pm
- folding
- offset

The prototype is designed to make use of geometric shape for shading and lighting. The core control elements are specific solar elevation angles in different seasons for the north light and west exposure problems. From the study of the natural settlements, several operations are used to optimise.
Wind channel prototype

The library units are organized to optimize ventilation in summer while avoiding freezing wind in winter. Based on the wind channel prototype, complex urban context is considered to trigger a well-designed walking path offering physical comfort feeling in two extreme seasons.

The area of the site is even larger than "blocks" in other cities. Its organization refers to a urban-scale design method. The circulation is proposed according to the surrounding urban context. Squares and hotspots are built to enrich outdoor spatial experiences.
LIBRARY FACADE: STUDY OF THE CURTAIN WALL

This research tries to explore a new kind of durable facade material tackling the discomfort glare problem considering the local rainy climate for the library. The picture on the left shows a typical window of the Hui-Style Architecture. The tiny window outside with an enlarged outline inside provides a bright and gentle light environment.

Light simulation

Morphology Transformation

When we read near a normal window, light usually strikes directly and creates disorientating glare, especially around noon. If we reduce the size of the hole on the outer surface and enlarge it on the inner surface, strong noon light can be blocked out and light can go inside after diffusion and reflection.

Cluster transformation

Grid transformation

homo-network transformation hetero-network for different activities
Drainability tests

Since it rains frequently in Shanghai, facade drainage is very important. Clay can be gradually eroded and stained if immersed in water for a long time. Different types of texture are tested under water to optimize the drainability. The V shape texture, though simple, works efficiently.

Detail drawing

- Clay for drainage
- 100mm insulations
- 5mm vapour barrier
- Glass sealed framework
- 10 mm cable wire clamp
- Cavity structure
- 30mm clay

Interior Daylighting

Solar altitude is much higher in summer than in winter. In any season, morning sunlight shines inside the room. Sunlight at summer noon can be blocked out while in winter direct sunlight comes in.

9:00 12:00 15:00

Summer

Winter
AMBIGUOUS PARTITION

Components Study and Community Library Design

Tongji Core Studio 16 Weeks Personal Work, 2013 Fall
Instructor: Li Yi

The project is inspired by a scene in which a man is sitting under a tree reading a book. The interaction between human and components of the building well represents the similar spatial feelings: components as an anchor for activities.

However, when we rethink those spaces defined by walls and columns, they always restrict the movements of participants with clear directions and efficient routines. This project discusses ambiguous partitions which invite users to explore activities following their personal preferences.
User-Limited Partition

The clear-defined space follows the efficient rule while a proper disorder provides new possibility of space: motivating participants to define their own space domain and routine.

Columns can be regarded as converged walls. With the study of morphology transformation of basic structure components (wall, beam and column) in spatial and structural aspects, I try to design the ambiguous partition using the COLUMN prototype for a more public community library.

Components

- **BEAM**
  - Vertical extension: More space definition.

- **COLUMN**
  - Horizontal extension: More space definition.

- **WALL**
  - Shift and movement: Fewer arrangement

- **Ambiguous Partition**

Comprehension zone

Tension zone
FRAMEWORK GENERATION

Grid transformation

The new COLUMN prototype is generated from a basic column network to fit in basic structural span. Quadrilateral and hexagonal grids are combined according to specific spatial demands. Besides, although anisotropic, I used genetic algorithm to achieve optimized modularization for prefabrication.

Cluster transformation

The COLUMN prototype is transformed regarding to the demands of activities from the most public and continuous space to private space. Participants are encouraged to choose their preferences. The most penetrable frameworks are for public activities, like the info desk, book stacks and lecture halls. Most enclosed space is for personal reading.

Genetic algorithm for modularization

Orthogonal grid

Ortchoxagonal grid

Anisotropic grid

Cluster transformation

Public space

Personal activities

Lighting/Vertical connections
The topography of the site, introduced into the library, forms a freely circulating area and separates basic functional regions on different elevations. The topography intervention blurs the differences between exterior and interior feelings, which is more suitable for a daily life-oriented library.
Furniture is organized around the columns, defining spaces for different functions. The only walls are built to create functional space on the first floor.
**Lightweight Partitions**

The structure for this project is composed of 12mm-thick steel plates reinforced with flanges. The steel plate is covered with concrete to prevent buckling. It is built into a thin wall which makes the whole building look like a light framework placed on the raw ground. The community library, more like a community center, creates spaces with different defining interfaces and invite citizens to choose their preferences. The first floor behaves like a public gathering place while the second floor is designed for reading.
FLOWING CORE

Air Study and Infrastructure Prototype Design

Design Against Smog International Summer School 2015
(2 Week Group Work)
Evolo Skyscraper Competition, Honorable Mention, 2015
Contribution: Concept, Air research, Core Design
Instructor: WANG Zigang, LIUD Jing
Collaborator: WU Xiaoyu, OHE Jin, LIU Fanghui,
Pietro SPA, Tomoei Shoda

Since the exposure of its air pollution problems in 2008, during the Olympic Games, China has strived to improve its air quality. However, 8 years have passed, the smog-filled sky has become even more intense. This problem have created an opportunity to rethink the position of architecture under the condition of severe smog.

Instead of physically defending outdoor polluted air, this Utopian project, tries to design a thermodynamic machine, incorporation of passive energies, as a new core prototype for the skyscraper joining into the great war against smog.

What’s more, the new core prototype is expected to be built into a new kind of air infrastructure network using F.A.R. BONUS policies to encourage the developers. It meanwhile aims to educate all citizens.
Only Interiors COUNT

Fig 1 In-House, Transportable Standard of Living Package, Remy Blumen and Peninice College, 1965

Well tempered environment inside and severe smog outside

Exhibitions, documentaries and dates record the smog of China.

Undoubtedly, China has entered into an era with increasingly severe environmental crisis. Air, as an essential element, was always neglected in the architecture design.

The well-controlled facades, like a mask, form standard buildings around us with advanced facilities inside. However, like the image on the right, human wearing miasma surrounded by well-controlled buildings depicts the embarrassing condition in most big cities in China. As an architecture student, I would like to rethink the strategies of relationships between buildings and air: space as air instrument or air instrument as spaces, bring more possibilities for the space design.

Interaction between Air and Space

Larkin Administration Building
Frank Lloyd Wright, 1903
Richards Medical Research Laboratories
Louis I. Kahn, 1952
Kunsthalle Bregenz
Peter Zumthor, 1997

"Space as Air Instrument"

Air equipments well organized inside the tubular structural space inner space and forms achieved the architectural monument.

Air as an instrument.

"Air In Space"

Subway has the piston effect of air conduction of 7140m³/hr. This is a huge passive energy neglected.

Elevator also has the piston effect of air conduction.

The stack effect is often used for air conduction in space.

The study shows various spaces influenced by air. Spatial elements act as air instrument tangibly or intangibly. They create diverse spaces while maintain physical comfort within the room. And air in the space contains existed passive energy which we have always neglected.
New Prototype of the CORE

The site LLUIAZUI consists of nearly one hundred skyscrapers. Behind the ever-changing facades of the skyscrapers, the never-changing core structure owns spatial potential. Like the atrium in the core of Jinmao Tower.

A new core prototype is designed to work as a thermodynamic machine, incorporating those existed passive energy (from subway, elevator and atrium) to conduct air through a series of air cleaning process, so that the toxic pollutants in the atmosphere can be absorbed by the advanced and energy efficient methods. Meanwhile more public and green spaces are created in this process.

LLUIAZUI: super high-rise cluster morphology

25'25'200 Service space Void space Air cleaning process
Transportation Spatial Layering Air Exchange Activities
Urban Infrastructure System

With the smog becoming a national issue, DENSITY BONUS can be adopted to encourage enterprise to apply the new core prototype. Skyscrapers not only act as functional buildings, but form an URBAN AIR INFRASTRUCTURE SYSTEM and educate citizen as well.
HYBRIDIZED ENCLOSURE

Context Study and Urban Complex Design

Tongji Core Studio (9 Weeks Group Work)
Contribution: Field Research/Strategy & Concept / Plan
Instructor: Cai Yangjie
Collaborator: Wang Jialei

The upheaval of Shanghai’s development results in the forced displacement of people who used to live in very modest traditional houses (Hongs). Some resist, mainly the older generation who do not want to change their lifestyle.

This project aims to extend replacement strategies which fail to collaborate different containers of memory to depict the city identification.

As an urban complex, the project aims to synthesize resources for integration and productivity. However, it locates at a special site: Daming Road, a famous cultural street, full of memories of the local residents, with many Historic Relic Buildings that once belonged to many literate and cultural institutes. The hybridized enclosure is proposed as a spatial strategy to deal with conflicting demands between capital profits and cultural protection. Specific “Order” tries to face the chaotic urban context from the heterogeneous spatial situation in Shanghai.
Forced Displacement in Urban Transition

City is constituted by collective artifacts. In Shanghai, spaces ranged from port-opening to the Reform Policy act as the container of memory.

Undoubtedly, however, recent urban transition in Shanghai follows a kind of generic city’s pattern for efficiency. The gentrification results in the forced displacement of people who used to live in very modest traditional houses (longs) following the old lifestyle. Is replacement the only result of urban transition?
In order to satisfy conflicting spatial demands between capital profit and culture protection, this project tries to analyse possible spatial strategies for each demand and mediate the conflicts.
Systematic Duality

The project can be developed by both public and private sectors. The volume facing Baoshan Avenue is organised to serve commercial profits, including shopping malls, supermarkets and canteens. Office buildings’ entrances are placed towards Baoshan Avenue for light rail commuters and drivers. Three small-scaled volumes inserted on Darroch Road, together with the square defined by three historic buildings, enhance traditional street atmosphere.
Bilateral Interface

The project expresses bilateral interfaces towards the on-going gentrifying Baoshan Avenue and cultural Darroch Avenue where traditional street activities can be well protected. Joint investment by public and private sectors can realize mutual benefit. The protected cultural street can attract tourism for the commercial and at the same time keep its identity.
PROFESSIONAL WORK

05

TOWER in MOUNT EMEI

CAI Yongjie Atelier, Tongji Architectural Design Co., Ltd.
Chinese Housing Modernism
Research on the Tongji New Workers’ Village

Tutor: ZHOU Jianli, U Danfeng
Member: YE Zhili, CHEN Hongyu, U Chen, WANG Jingkai

The Tongji New Workers’ Village built in the 1950s could be taken as an example of unique modernist practices in China. The Socialist “production of space” had once again brought the idea of “Utopia” into reality. It is a living proof of the localization of modernism in China.

The Tongji New Worker’s Village was originally built as dormitories for the staffs in Tongji University. And because of this special state ownership, the construction in Tongji New Workers’ Village continued from the foundation of the Republic of China to the new millennium. It recorded the development of residential housings in Shanghai along with the entire national economy.
1957 | Tong building (同楼) | 40.8m²/unit
Tong building consists of four floors. Each unit was shared by 2-3 families.

1957 | Cun building (村楼) | 59.85m²/unit
Cun building was added in the Tong building and each unit was shared by 2-3 families.

1984 | Tong 7 building (同楼) | 57.3m²/unit
Major horizontally staggered housing unit to satisfy lighting requirements.

1974 | Staff building (员工楼) | 32.04m²/unit
One family owned one unit with small area of 2-4m².

1986 | Store building (商店楼) | 38.9m²/unit
Living room first came out as an empty space. Housing shortage resulted in the shrinking of the unit area.

1965 | Staff building (员工楼) | 51.33m²/unit
Living room first came out as an independent room.

1994, Staff building (员工楼) | 57.06m²/unit
Largest unit. The living room was enlarged for family gathering activities. The area of bedrooms were shrunk.
SUPPLEMENTS

Social Space Concept Study: Rural Settlement Form Under the Influence of the Equality Policy and Traditional Habitus

Tutor: CAI Yongjie, Marshall Johnson, Ferry Yang | Supported by Sino-US Eco Urban Design Joint Lab
Member: PAN Zijie, PEING Shuman, LU Han

During the recent rapid urbanization in China, realized forms of rural settlement have been reshaped. Field study on Chongming Island reveals a unified grid structure settlement form (Fig-1), distinct from the traditional village. The homogenous form of Yuan village, which we take as the investigating sample, is presented in three characteristics: a homogenous grid framework, some building layout and similar house contour.

1) A homogenous grid framework equally organized agricultural production

The fundamental elements of equal and unified spatial form are based on the construction of a grid system. Due to demands of agricultural production, the grid provides the most efficient way for purposes of cultivation to divide the farmland equally in the overall macro grid framework of canals on Chongming Island. With possible natural resources, the government arranged series of dredging projects from 1958-1973, which resulted in the three-level water system. Roads construction followed the initial form of the water system in two perspectives: one is arranged perpendicular to the canals so as to divide farmland equally. The other is arranged parallel to the canals to supplement usage (Fig-2, Fig-3).

2) Repetitive building layout — traditional habitus

The similarities of house layout at medium scale can be explained by deploying the social space concept of “habitus.” Conventional lifestyle and production patterns of rural China tend to support a habitus that results in the equal and unified settlement form in social practice.

- North-south Axis
- L-Shape Plan

Normally, the received form of house layout in the homestead is L-shaped, with a kitchen detached from the main residence. External kitchens originally aimed at smoke dispersal. Even though smoke evacuation technology has progressed, most houses keep the external kitchen because long-term life experience with kitchens has molded the detached form with the habitual definition of kitchen. (Fig-4)

- South Entrance

A site is typically left open on the south of the house in front of the main entrance even for the house on the south side of the road. The consistent entrances contribute to equal and unified house form without being affected by relations between roads and houses. Although agriculture activities have dramatically decreased, the open space originally for drying grains is still kept.

3) Similar contour and size — “equity” policy

- A specific quantification of architecture distance
- Architecture contour

In addition to regulating distance, the procedures also placed limitations on homestead and footprint. (Fig-5)

Demolished traditional spatial form

By traditional practice, the area of a Four-Canal Building (Fig-2) was owned by one family. At present, however, the distribution of village houses has nothing to do with the Building Canal. Houses are arranged according to limited homestead and stick to a homogenized village pattern. Nowadays, the two buildings surrounding one Building Canal belong to two different families.
2015 Vertical Cities Asia Competition: Everyone Contributes
Singapore, Paya Lebar

Exhibition and Relevant Publication

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