CONCENTRIC CORES:
Towards An Architectural Typology Of
Chinese Compound Houses

by

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Submitted to the Department of Architecture on April 1, 1983 in partial fulfillment of the requirements for the Degree of Master of Science in Architecture Studies

ABSTRACT

This thesis presents the intention of a theory and method in the studies of architectural types. It is believed in this theory that architectural types must be understood in cultural terms but described by means of geometric systems.

The theory deals with two major subject matters: 1) the basic geometric form, in which a general type is presented, and 2) the transformations beginning with this geometric origin, in which various types are discovered.

The starting point in chapter 2 is the ideal form of the Chinese compound houses, transformed from the cultural and social theme of family structure but represented by means of a series of geometric models. The geometric rules, transformed from social codes, conventions and agreements, dominate the typological transformations of these models, in which different patterns of transformation are classified. The classification of these patterns reveals the associations and distinctions between types.

In chapter 3 the Taiwan area is taken as a regional example to demonstrate this theory and method, in which the regional interpretations of the ideal forms and the local transformation patterns are explored. The exploration of these local patterns establishes a basis on which further typological systems may be developed.

Finally, two immediate issues are raised for further research: 1) about studies on settlement typology, in which the types of villages, towns and cities will be dealt with on the general basis of this theory, and 2) about an approach to design methodology by means of creating building types on the basis of the theoretical understanding and geometric analyses presented in this thesis.

Thesis Supervisor: N. John Habraken
Title: Professor of Architecture
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PREFACE
In 1973, when I was a junior in college in Taiwan, I began my own study of traditional Chinese architecture, particularly the Chinese courtyard house, seeking a modern way to recreate a new type of Chinese traditional architecture. This was the origin of the current research, however, is only the initial presentation of my present work and philosophy in architecture.

I was extremely impressed in the beginning years both with the similarity of formal structures and with the distinction of individual characteristics between different types of Chinese courtyard houses, regardless of the function for which they were used: for dwelling, for ceremony or for political management and control.
From the study of those traditional courtyard houses, I have come to realize a basic fact that behind those house types was the same implicit structure dominating the actual house forms, even though the explicit variety of those house forms come from different social codes and agreements. I was convinced that only through the understanding of this fact I could understand the relationships and the distinctions between different types of Chinese courtyard houses.

In the beginning of 1980, I was fortunate enough to participate in a project of rebuilding the traditional environments of the native people of Taiwan as an open museum. For this task the design team, including another designer, two anthropologists and myself, visited villages of each of the nine aboriginal groups in Taiwan and did a great deal of documentation research and survey.

This work convinced me even more of the notion of implicit structure behind architectural types and made me realize the physical changes that took place in the living environments of the villages. Besides, due to the comparative simplicity of the native cultures, these facts were then easier for me to study than they would have been in a Han Chinese village.

The realizations of the implicit structure and of the explicit variety of form, or physical changes of environment, are the fundamental ideas behind this theoretical approach to the ideal model of the Chinese compound house and its variations. They are the beginning of the general theory of the Chinese house type that is presented here. They have also shaped my present philosophy about architecture in general.
A Statement

At the very beginning I would state that architecture in a given cultural context is independent by itself. Only when this fact is understood can the theory that is to be presented through this research be fully understandable.

To show that architecture is a cultural force independent of any individual act, I shall try to convince the reader that among the architectural types of the Chinese courtyard house there is an underlying but identifiable system, in which each architectural type can be given a place.

If we look into the order of physical form, some logical relations between the types of form usually can be found. Using these types as models, people then
adapt them to different requirements, for example, territory, use, activity and so on. In terms of this idea I believe that architecture can be studied only through an independent system of architectural form. The process of architectural transformation can go its own way without being determined by any single particular factor.

It is true that people can visualize the order of form set up in some particular socio-economic and cultural context, but what I want to clarify here is the underlying system, which will explain the hierarchy of form by means of a geometric approach. Based on this systematic framework, I shall discuss the ideal model with its various interpretations and, then, explore the different types of transformations in their own particular contexts.

This research is about the Chinese courtyard house in Taiwan, which will be called the compound house in this thesis. Compared to other architectural types, for instances, the Korean and the Japanese houses, which are also branches of Oriental architecture, the Chinese compound house is the type with the most complex underlying geometric system but with the most systematically recognizable structure.

By applying this geometric system to what we see in reality we can distinguish specific patterns of transformation in different contexts. In other words, it will be possible in this way to place the forms representing local values into a general frame.

Finding the best way to describe the manifestations of built form in a systematic way has been one of the major tasks for researchers in architecture. I believe that only through a clear descriptive model of the typological transformation can the architectural types be
better understood. The development of such a model, I think, will be the most crucial part of this research.

3. The courtyard is from the geometric viewpoint not one of the physical elements of the compound house but the empty volume confined by solid elements. It is not at all the dominant character in structuring the configuration of the compound house. This term was first used in "The Survey, Study and Restoration of The Lin Family Compound in Pan-Chiao" by Han Pao-Teh and Hung Wenhsiung published by the Department of Architecture, Tunghai University, 1973 Taichung, Taiwan.

4. This comment is based upon personal comparison among these three architectural types. I believe that it is significant to understand the relations between them because of the similarity of wood-structure and the close relationships in culture.
CHAPTER 1 Introduction

1.1 Approach

The Theory 1.1.1

Two Aspects of Understanding 1.1.2

Towards An Architectural Typology, the Typological Systems 1.1.3

1.2 Goal

1.3 Scope of Research

1.1 Approach

The Theory 1.1.1

In the beginning I mentioned two fundamental notions of the general theory: 1, the implicit structure and 2, the explicit variety of form. They are the two subjects of this research, leading to the explorations of the ideal model of the compound houses and of the typological transformations of its architecture.

The ideal model and its transformation rules will be explored by means of a geometric framework in this thesis. The further work of associating and distinguishing the house types will be done by using the same geometric framework.
The geometric starting point of the transformations is the so-called "core" of the configuration of the compound house.

Beginning from the core and following the transformation rules, new types can be developed by steps of geometric reduction or expansion of the core. These types also can be found in reality as I will demonstrate by means of examples from China and Taiwan.

The notion of "core" and the rules go together. They will be explored in cultural and social terms as well as in terms of geometry. They are the two aspects central to understanding the architectural typology.

All the house types set into this geometric framework can be assigned to different categories in terms of a geometric hierarchy, which creates the distinctive relationships between these various categories of type. These categories of type can be further interpreted as different typological systems and the geometric hierarchy is the order among these systems.

Finally, we come to the understanding that the typological association and distinction between types may be reached through this order of typological systems.

5. The details about the "core" of the compound house will be presented in the section of 2.3.5, 2.3.6 and 2.4.7. Here, the core means the most internal layer of the physical concentric layout of the compound house, shown in Fig.9 and 10.
Two Aspects of Understanding 1.1.2

The first statement concerning the understanding of architectural typology is that we only see the architectural types through the geometric description of the cultural or social theme and its transformations. This means that the typological system represented by certain groups of types and the ideal model of those types can only be described by means of the geometric language; although, the implicit structure (i.e., the transformation rules) are derived from the cultural or the social values. Gradually, we begin to see the relationship between these two aspects.

The core of the Chinese compound house is the physical representation of the major implicit social structure in Chinese society: the unchanged traditional cultural theme of the relationships among family members. This social structure is related to the ideal model of the compound houses. Nevertheless, this ideal model has been in the minds of the Chinese people for a very long period of time.6

Interpretations

However, due to the difference between regional or local themes, different interpretations of the ideal model can be made and many different transformations have been created. In consequence, we see in reality the physical variations of the core and its local transformations; but, the ideal model remains hidden and similar.

A number of major regional configurations of the core are very similar to
one another; in fact, according to the theory presented here, they share the same implicit structure resulting from the same cultural theme. For instance, the Taiwan area is one of the areas covered by the Chinese culture but has its own regional interpretations of the cultural theme, which results in the geometric variations of the core in this compound house.

Not only due to the cultural and social codes, but also due to the regional and local needs, are a series of rules and conventions encoded and shared in the regional and the local transformations of this region.

Towards the Architectural Typology, the Typological Systems 1.1.3

As a scheme of the entire thinking, Fig.1.1.3 brings together all the discussions about the notions of the general theory. In this flowchart we see much clearer that a great amount of preliminary work has to be done before the final task of this research (i.e., the establishment of the typological systems) is reached.

I shall start with the thematic transition from the cultural theme and the social codes to the geometric logic (i.e., the explorations of the ideal model and its variations). This is the initial work I am going to finish with this thesis.

Proceeding from that I shall explore the geometric analyses and syntheses for consolidating the geometric frame.

6. The history of the Chinese courtyard house has been more than 2,000 years long. The same as note 8, p. 26.
 Afterwards, by using this frame as a general basis I will establish the typological systems.

Through this understanding of the order of these systems I not only can relate different types to each other, but also can distinguish them from one another. This is what the theory and the method can answer to part of my original questions about architectural type and is one of the ways by which we come to see the architectural typology.
1.2 Goal

First Task of The Research

I will first explore the ideal model of the compound house and its variations by means of a theoretical approach. Secondly, I will apply this theoretical approach to the regional case of the Taiwan area by exploring the particular regional interpretations of the ideal model, and by discussing several common patterns of the local and thematic transformation. As a result, we will see what has not changed in the transformations, which will reveal the rules of the system.

That is the first step of a number of larger tasks of the whole research plan shown in Fig.1.1.3. It prepares for the further work of setting up the typological systems that will clarify the various relations between different house types, and will allow us to understand the transformations of form in reality.

At the conclusion of this thesis, several essential issues will be raised for further discussion and study in order to connect this general framework to larger contexts, which bring different interpretations to this ideal model and to the order of physical form.

Connections to The Larger Tasks
Connections to The Larger Tasks

The ideal model is, then, only the initial basis for setting up the further geometric systems in which are incorporated the physical elements and the basic models of house types. This is the next task of research, lying beyond the scope of this thesis.

Ultimately, I shall set up the general typological systems by going through a series of type-selections resulting from the regional and local context. Finally, based upon this typological framework, I can discuss specific local and thematic transformations, in which we will go back to the combined understanding of the two aspects: the local theme and the geometric interpretation.

This is the entire structure of the whole research about the architectural typology of the Chinese compound house.
1.3 Scope of Research

The range of this study in the continuity of built form is from the single house through the large compound to the level of village tissues. I shall both explore the models and demonstrate them with cases.

The content of this research is based upon the case studies of compound houses of the Taiwan area. This area includes the Taiwan, Penghu and Jinmen islands, which are located off the southeastern coast of the Chinese Mainland. Although timelessness is one of the characteristics of the geometric approach, the case studies mainly focus on the compounds built on Taiwan during the periods from the middle of the 17th century to the present and from about 500 years earlier to the present on the Penghu and Jinmen islands.

Since the 1950's, the tremendous physical changes have come about in towns and in cities because of the "miracle" of economic success; but, in the countryside the villagescape has not changed much except for the emergence of some new constructions of institutional and residential buildings.

At the present time the Chinese culture, no matter whether of Communist China on the Mainland or of Nationalist China on Taiwan, is right between the traditional style and the new growing style. This study may be important for our understanding of the appropriate architectural transition in correspondence with the cultural transition.

7. The economic development of Taiwan
during the past one and half decades has been quite well-known over the world as a successful example of the economic development in the developing countries. This term "miracle" has been employed to describe this economic success widely both in Chinese and in English articles.
CHAPTER 2
CHAPTER 2

THE CONCENTRIC CORES: A THEORETICAL DESCRIPTION OF THE CHINESE COMPOUND HOUSES

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2.3 The Concentric Structure of Relationships Within the Chinese Family

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2.1 Introduction

Two subject matters are discussed in this chapter: 1, the relationship among members of the Chinese family and 2, the ideal physical layout of the compound house. Between them, I shall present the transitions from the cultural theme of family to the geometric model of the compound. To both of them there is the same dominant "concentric structure", which will be understandable through the presentation of the position order existing both among family members and among the single houses within the compound.

The center of this concentric structure is the sacred place, symbolically between the human being and heaven, used for ceremonial worship both to the gods and to the ancestors. Around this sacred point, houses and people can take position. The more distant the position, the less important its occupant.

Besides, certain patterns of position can be obtained by taking certain parts out of this general frame. Within such a specific pattern the sacred point, the origin of the whole system, must be contained. These basic patterns, I call the "cultural cores".

Proceeding from the cultural theme, I shall explore the ideal models and, afterwards, in terms of these previous discussions, I will give a brief conclusion about the physical characteristic of the Chinese compound house.

2.2 Spatial Context
2.2 Spatial Context

Fig. 1 Eight Areas of The Chinese Compound Houses

N.C. North China
N.E.C. Northeast China
I.M. Inner Mongolia
W.C. West China
E.C.C. East Central China
W.C.C. West Central China
S.E.C. Southeast China
S.W.C. Southwest China
T. Tibet
The "Compound House" is the most widespread house type in China, covering at least eight regional areas: North China, Central China, Southeast China, Southwest China, Northeast China, Inner Mongolia, Northwest China and Tibet. In each of them particular regional or local characteristics can be easily observed among the common types.

The Taiwan area actually comprises a sub-area of Southeast China in terms of the similarity of form and of cultural tradition. All of the present Chinese on these islands and most of the ancestors of the Taiwanese were from the Mainland, especially from Fujian and Guangdong Provinces. They brought their traditional technique of construction with them to the islands when they were building their new settlements.

There is evidence that the compound house has existed for more than 2,000 years in China, originating in the Yellow River Valley of North China. With the migration of settlement to other areas, the basic form of the compound house together with the elementary ideas about the relationships among family members spread throughout China. From the 7th century on, Chinese began to migrate to the Penghu islands between Taiwan and the Mainland, and beginning from the 12th century on, to Taiwan.

8. "中國住宅概說"-- 劉敦樸
"An Outline of Chinese Houses" by Liu Tunchen, 1957 Peking
THE CULTURAL THEME OF THE CONCENTRIC STRUCTURE

2.3. The Concentric Structure of Relationships Within the Chinese Family

Ancestry 2.3.1

The major ancestry line of the Chinese family has usually been the lines of the eldest sons of subsequent generations. The minor ancestry line is the line from the first-born son to the last-born son of a particular generation of this family. The 1st ancestry line determines every member's vertical hierarchy and the 2nd ancestry line determines this member's horizontal hierarchy. Combining these two hierarchies, one can understand the member's status in this family.

Together with the sacred core, these individual statuses will afterwards determine the position order of the family. This position order then will shape the general pattern of the order of form, from where a series of ideal patterns of space order is derived for accommodating every
family member and his own family to the chronological place within the larger context of clan.

On the right-hand side of this page Fig.2(a) shows the family with only two generations: the father and his three sons. Fig.2(b) shows the family with three generations: the father, the 3 sons and the 1st son's 2 grandsons, the 2nd son's one grandson and the 3rd son's 3 grandsons. Here, the major ancestry line is from the father to the 1st son, then to the 1st son's 1st son (i.e., the 1st grandson 0-1-1).

In Fig.2(c) we see the same principle applied to the family with more than three generations. Here, we can see the vertical ancestry lines and the horizontal ancestry lines, in which the vertical lines dominate the horizontal lines. Whenever we want to find any member's po-
sition in terms of the ancestral dominance, we have to find the right vertical line first, then follow the horizontal line of his generation.

This process of tracing up to the ancestors has also been the way of clarifying the relationships between any two members of the same Chinese family or clan when they meet and begin to talk. In this situation, to find out their relationship in terms of their ancestry is always the beginning topic of their conversation.

They first follow their own vertical ancestries up to certain ancestors they both know, then compare these two ancestors' hierarchies of generation by following the horizontal ancestries.

The same way of distinguishing the relationships has even been applied to that between two persons from the same place, for example, the same village or the same town.
In the Chinese language the hierarchy of generation is "bei-fen", "辈分", and the distinction of the relationship is "lun-bei-fen", "論輩分". Traditionally, it is the firstly considered dialogue for two Chinese to "lun-bei-fen" when they meet and begin to communicate: "Where are you from, place and family?" 9

This is the way by which the Chinese people make the distinction of relationship between themselves within the family. This distinction will finally together with the sacred core create the position order.

---

9. All the information that the entire discussion has been based on has already become part of the common sense about the traditional Chinese family among educated Chinese in Taiwan.
Adapted from one of the Chinese cosmological ideas about the relationship between the human being and heaven, the sacred core was set up precisely at the center of the whole complex for the ceremonies. These ceremonies are primarily the worship to heaven and secondarily the worship to the ancestors.

On the north-side of the sacred core there is the position for locating the sacred shrines principally of the ancestors and secondarily of the gods, where the family worships the ancestors.

In Fig. 4 the diagrams of from (a), (b), (c), ..., to (i) show the locations of the sacred core with the sacred shrines among the individual statuses. Each of them is a pattern of the relationships among the sacred core and the individual statuses within the family. The central square of each pattern, marked with the cross, is the sacred core. Located on the upper-edge of the sacred core are the shrines of the ancestors and of the gods.

The black dots of those diagrams, drawn in different sizes, represent the rank of particular individuals: the bigger dot, the higher rank. The white dots represent those members of the oldest generations; general speaking, older than the chief of the family. They are traditionally the counsellors of the chief.
Fig. 4 The Patterns of the Relationships Among the Sacred Core and the Individual Status in the Chinese Family
These patterns have been commonly applied to every kind of physical arrangement such as the site plan of architecture, the furniture-distribution of interior layout and even the position-pattern of certain social group for every kind of formal or ceremonial meeting.

10. Two cosmological ideas crucially concern the sacred core are 1, "Tien-Yuan-Die-Fang", "天圓地方", and 2, "Tien-Jen-Ho-I", "天人合一". The first means that heaven is circular and the earth is square. The second means the integration of heaven and the mankind, representing the Chinese philosophical idea of seeking the wholeness of the universe.
Position Order, the General Pattern

2.3.3

Fig. 5 shows the implicit structure of position order behind the individual statuses of the Chinese family. The numbers represent different positions and their corresponding statuses: the smaller the number, the more important or the higher the position. Here, each of the male family members occupies a position and each of the wives shares her husband's position. Even after the husband dies, the wife remains in his position.

Position (4) of Fig. 5 is in terms of position order at the same level in the hierarchy with position 4, if occupied by some member; but, it is usually only for public use as a central hall. (4) is in fact the alternative option of position 4. The same is true for position (7) relative to position 7, position (10) to position 10, and so on.
The Shifts

There are two other options of possible shifts in the position order. The first option is to move horizontal positions to the positions between two of the rear positions of the sacred core and the 2nd option is to move the horizontal positions to places between two of the front positions of the sacred core. For instance, positions 5 and 6 can be either moved to (5)_{1} and (6)_{1} between (4) and (7) or be moved to (5)_{2} and (6)_{2} between 1 and 4: the same as positions 8 and 9, 11 and 12, and so on.

These shifts between positions create physical transformations. By taking any allowable arrangement, (which must contain the sacred core with the sacred shrines of the ancestors and of the gods), out of the general pattern, a great variety of house forms can be obtained. This variety is created for various families with different sizes to, in terms of individual status, locate their family members.
The Ideal Patterns of Position Order 2.3.4

The 1st Ideal Pattern

The central part of the general pattern is taken out of the frame as the 1st ideal pattern of position order for the ideal Chinese family with 3, 4 or 5 generations: the grandfather, the father, who generally is the chief of the family, the sons, the grandsons and the grandfather's father if he is still alive. Their locations are shown in Fig.6 (a) and (b).

Fig.6 Two Options of The 1st Ideal Pattern

The 2nd Ideal Pattern

The 2nd ideal pattern is attained by expanding the 1st ideal pattern to the next
positions of 5 and 6 when the family is growing with more generations or with more brothers, (i.e., the expansion of vertical ancestry or that of horizontal ancestry).

Fig. 7 shows the two options of the expansion from the 1st pattern to the 2nd pattern, as the result of the possible position shifts from 5 and 6 to (5)_1 and (6)_1 or to (5)_2 and (6)_2.

Applying the same principles of expansion to the next growths of either family or position order, I attained two options for each of the subsequent ideal patterns. One of them is the expanded pattern of the vertical position and the other one is the horizontal pattern. However, the 3rd expanded pattern of both the horizontal position and the vertical position is also easy to derive from the general pattern.

Fig. 8 shows the 3rd option of the 2nd ideal pattern; in fact, this group of expansion is the formal growth of the 1st pattern.
Nevertheless, each of these three options has been found in reality. It will be seen in the following texts that these different patterns of position order determine the cultural cores that then, confine the layers of the physical cores of the compound house.

Fig. 8  The Third Option of the 2nd Ideal Pattern

In accordance with the above understanding of the ideal patterns of position order in the Chinese family, I translate this cultural and social themes underlying the compound house into a formal structure of concentric order. This formal structure of concentric order does not only help to represent the family position order but also to relate the implicit structure of the physical cores to the social and cultural theme. In other words, this concentric order combines the structure of the socio-cultural theme with the structure of physical cores in the compound house.

As a result, in my fieldwork I have observed this concentric structure and its transformations within the compound house, as I will show in the section of 2.4, "The Ideal Layout of the Compound House".
There are two representations of concentric order: 1, the concentric circles and 2, the concentric squares. When I am discussing the general patterns of position underlying the Chinese family structure, the concentric circles will be employed to represent the implicit rules of the human relationship between family members. In corresponding to the discussion of 2.3.1, "Ancestry", this also can stand for the ideal model of the Chinese traditional idea about human relationships.

As mentioned in the note of 10, the Chinese cosmology has given the formal image of square to the earth on which the human being has residence so that the dwellings should be created in the square forms or in its rectangular transformations in order to fit to the nature of the earth.

I would think that it is obvious to choose the "Concentric Squares" to represent the structure behind the physical
patterns of the houses and use the "Concentric Circles" to represent the structure underlying the relationships of the Chinese family members.

The general subject is then the principle of position order which not only determines the member-relationships of the family but also the distribution of the single houses in the compound. Through the member-relationships we come to see the individual statuses and through the house distribution we come to distinguish different types of the compound houses.

However, examples of circular compound houses do exist in reality as well. 11

11. The Hakka people's circular compounds are the most impressive examples, existing in the Fujian and the Gwangdong Provinces.

"福建", "廣東", of southeast China. Some typical ones of them will be presented in the section of 2.4.6, the "Regional Variations" of the ideal model. They are figures 24. (33), (34), (35), (36), (37), and (38). Among them, the later three are circular compounds.

Resources:

(1). "中國住房概說", by "劉敦桢"
"An Outline of Chinese Houses"
by Liu Tunchen, 1957 Peking

(2). "中國古代建築史", by "劉敦楨"
"A History of Ancient Chinese Architecture", by "Liu Tunchen"
The Cultural Cores: The Layers of Core, the Growth of the Ideal Patterns 2.3.6

Fig. 10 shows the details of the concentric squares, in which we see the cultural cores and the layers of core. Each of these cultural cores actually contains one particular ideal pattern of position order, which together with the others shape, in terms of formal image, the general pattern of the concentric squares. With this general pattern, I begin to visualize, in terms of geometry, the general rules from the cultural theme. Through the general rules then, we can realize the formal growth of the compound house and see the character of each ideal pattern in this formal growth.

Between every two neighboring cores there is a layer. For example, the 1st layer is between the sacred core and the 1st core (i.e., the central core), the 2nd...
layer is between the 1st core and the 2nd core, and so on.
Generally speaking, each layer physically contains two kinds of space: 1, the house and 2, the central and the side courtyards. The fringe of each core is usually confined by houses, or sometime together with walls, as Fig.10(b) shows.

What has been found significant in reality about the transformations of this structure is the major tendency of expansion, either horizontally or towards the front vertically. Only a few cases present the tendency of expansion to the back side of the sacred core vertically.
Towards the Patterns of Space

By expanding each edge of each square to the outer fringe of the concentric structure I obtained the matrix of Fig.11, which implies the patterns of space for locating houses and courtyards physically, and for accommodating family members socially. With the same position order, the houses of a higher order are built for the members with the correspondingly higher rank to occupy.

Within this pattern the sacred core becomes the spatial module. The entire structure is constructed by beginning with the central module and then, by repeating it layer by layer from the center to the fringe.

Fig.11 The Matrix: General Pattern of Space

This Spatial module will lead to an
understanding of the "Bay" that is the basic spatial unit in every type of Chinese traditional architecture. However, here the discussion about the bay will only focus on the compound house.

Every space pattern, a sub-matrix of Fig.11, shown in Fig.12 is a correspondent to one particular pattern of position. Based on these sub-matrixes, the models are created.

12. Here, I mean the architectural tradition of "Han", who are the major group of Chinese and have created the dominant traditional culture in China. "Han" is in Chinese "漢".

1st space pattern: 9 spatial modules

2nd space pattern: 25 spatial modules

3rd space pattern: 49 spatial modules

Fig.12 Space Patterns for Structuring the Models
The Bay 2.4.1

The bay is the elementary space unit of the compound house, employed as the spatial module to determine the order of position within the order of form of the compound house. The spaces formed by bays are where the family members will accommodate their status in the family to the spatial organization. The more important member occupies the bays with the higher order.

The single house in a compound has a number of bays, depending upon how many bays the occupiers need for each house in order to match the size of their own families and other demands.
In Fig.13, by giving the order of place to each of the space patterns taken out from the grid of space, I obtain the second series of space patterns: the 1st pattern of one-bay, the 2nd pattern of 3-bays, the 3rd pattern of 5-bays, and so on.

Among these space patterns, we see the 4 ordered places surrounding the sacred core, 2, the increasing number of the bays at each place and 3, the enlargements of the sacred core by squaring the number of the bays such as from one modular space to 9 modular spaces, to 25 modular spaces, to 49 modular spaces, to ... and etc.

Finally, these space patterns are applicable to the composition of the ideal models.

Fig.13 The Four Places Within The Space Patterns
The four sides of each core are in reality four houses. Each of them is composed by an odd number of bays, among which the central bay has the largest width. The next two bays symmetrically beside the central one have the second greatest width; then, the third pair of bays has the third greatest width, smaller than the previous two. Succeeding them, the 4th pair of bays is not larger than the 3rd one, the 5th is not larger than the 4th, and so on.

The houses are the dominant elements of form for composing the compound house. In this section I shall explain the composition of the houses first. The models of the compound houses will then be explored in the following sections.

Three-Bay House: the Basic Physical Element

According to both ceremonial and behavioral needs for a person or for a nuclear family, the basic layout of the house is designed with 3 bays. The central bay is larger for the worship to the person's or to this family's ancestors and the other two smaller bays are symmetrically put beside the central hall, shown in Fig.14.

In this layout of Fig.14 the left-hand bay of the central bay, the "L", is in terms of position order more important than the right-hand bay, the "R". Generally speaking, in the nuclear family, with only two generations, the left-hand bay is for the parents' use and the right-
More significant is that there is only one entrance to the central hall in which there are another two inside doorways leading individually to the other two smaller bays.

In the case of the compound with only one single house, the sacred core is still kept in front of the house, shown in Fig. 14(b). Here, the front courtyard of the house is still the place for dwellers to worship their ancestors and heaven, surrounded usually by a wall or a circumference of plants.

Expanded Houses: the Expansion of the Three-Bay House

Fig. 15 shows that the expanded houses are obtained by increasing more bays symmetrically to the original 3-bay house.
These expanded houses will then be employed as elements to construct the models of the compounds by following the order of place within the patterns of space, Fig. 13.

All the expanded houses have one entrance to the central bay; then, from here, the visitor can go to the other smaller bays through the inside doorways between every two adjacent bays. However, for the sake of moving conveniently, there is in reality the social agreement of allowing symmetrical openings to those bays attached to the 3 central ones.

Fig. 16(a) shows the order of bays within each of the houses. As well as the rule of the order of bays in the 3-bay house, order 3, succeeding order 1 and order 2, is on the left-hand side of the central bay, order 4 is on the right-hand side of the central bay, and the same as the others.

The previous order is applicable when the house is employed as a central house (i.e., those located on the vertical axis); but, there is the 2nd order of bay inside the house when the house is employed as one of the side houses located on the horizontal axis. Fig. 16(b) shows the 2nd order of bays inside the side houses. Here, with the exception of the central bay, the closer bay to the ancestral house is at the higher rank of this order.

Ideal Forms of The Compounds 2, 4, 3

Fig. 16 The Order Within The Houses
The ideal model consists of the central courtyard surrounded by four houses. Each of these houses has the same interior layout as the preceding texts described: house 1 was built for the parents, house 2 was built for the 1st son and his family, house 3 for the 2nd son and his family and house 4 used as the outer gate or for service functions, Fig. 17. Here, the central houses of house 1 and house 4 have the same number of bays, the same as the side houses of 2 and 3.

Generally speaking, when a member has a higher rank in the family, he can live in a house that has a higher position order. The central courtyard is the sacred place for worship and only the central hall of house 1 is used as the ancestral hall, in which is preserved the shrine and the altar for the whole family.
Fig. 18 shows three examples of the ideal forms. In (a), the central core of the compound house is an ideal three-bay model. In (b), house 4, used as the gate of the compound, is a three-bay house, although the others are 5-bay houses, and is moved away from the original place to the front of the whole complex. With (c) I show a reduced model of the ideal 3-bay model, in which the same rules are discovered except for the withdrawal of house 4.
Fig. 18(a) Shih Compound, ShieLin, North Taiwan

Built in 1870 A.D.
Constructed by 3-Bay Houses

The houses are presented much more distinct on the elevations and the sections below.
Fig. 18(b) 陈宅，“鬍三舘”，永靖
Chen Houses, "Yu-shan-kuan"
Yongching, Central Taiwan

Built in 1889

Constructed by 5-bay houses
Fig. 18(b)
Chen Houses, YongJing

5-bay houses

The Central Core and The Sacred Place, in which the structure is presented.

Alley

additions
Fig. 18(c) 范姜厝3號,新屋.
FanChiang Houses, HsinWu, North Taiwan

Built in the middle of the 19th century

Constructed by 3-bay houses, a reduction of the ideal 3-bay model.

The houses of this compound are very typical, which is presented on the plans, the elevations and the sections here.
The Central Core and the Sacred Place, 
in which the formal layout, or the 
structure, is similar to that of the 
preceding example.

Elements

- symmetrical 3-bay houses
- Additions
- Gate

It is much easier for the reader to 
understand the elements through the 
sketch, the elevations and the sections.
Expanded and Reduced Models: The Expansions and the Reductions of the Ideal Model 2.4.4.

The ideal model can be expanded similarly with the growth of the 1st pattern of position, whenever the family is ready to attach some additions to the original part for new members. This new outcomes then become the second core of the expanded compound.

Or sometime, it also is possible to reduce the ideal model when the family is not large enough to afford the construction of a big compound. The reasons come from the variety of limits in reality. They could be created from the sizes of family, from the incompetent economic situation or from the lack of land; however, the ideal model is always the target which every family wants to reach. On the other hand, the reduction can pro-
ceed from stage to stage until leaving only the house and its front sacred "court yard".

These expansions and reductions of the ideal 3-bay model are shown in Fig.19, which reveals the basic transformation rules of the models. Nevertheless, the dominance of the cultural theme is realizable by seeing the fact that the sacred is preserved in front of the houses of them, mostly at the center of the whole composition.

Variations on the Ideal Model

Culturally, the Chinese have always been attached to the 1st ideal pattern of position order that represents the Chinese ideal family structure consisting of 4 to 5 generations living in one compound house. However, due to certain realistic limits and considerations mentioned previously, people have created a number of variations on the ideal model. These variations can be discovered everywhere in China, especially in the Taiwan area because of the frequent shifts of socio-economic and political context from time to time and from place to place.

After the models of the compound houses are fitted to different local contexts, the physical cores retain their original concentric structure but can vary in their forms, in which we come to see the variations of the ideal model and the transformations of the structure.
Fig. 20 shows some variations on the 3-bay model. In the original model the sacred courtyard is enclosed tightly by the four houses, one next to another, without any space between them. Here, variations (b) and (c) are created by adding two bays or two alleys symmetrically to the space between either the two central houses or the two side houses. Each bay or alley is added to the front of each house. When these additions happen at the same time, variation (a) is resulted.

Reduced variation (a) of Fig. 21 is a particular one, generally appearing due to the limitation of land or of climate. Here, two side houses are taken away, leaving two central houses and the sacred core in between them. However, on both sides of the sacred core, there still can have two small additional houses or pavilions...
with two bays or three bays under each roof.

Fig. 21(b) shows another two sets of variations, with only three houses, and sometimes together with a one-bay gate in front of the sacred core on the North-South axis. In this case, the gate sometimes might be located on one side of the front edge because of the rules from the geomancy.

Fig. 22 shows two ways of growth of the ideal model in two directions. Here, (a) shows that another model or central house is added to the original model in depth, whether to the back or to the front. (b) shows that another model or side house is added to the original model in width: to the left first, then to the right. The same growth rules are applied to the other sets of variations as Fig. 23 shows.
Regional Variations 2.4.6

The following are common cases of different areas in China, showing different regional interpretations of the ideal model and local forms. Through these interpretations the variations and transformations from type to type are seeable.

Fig. 23  Growth in Two Directions, of the Reductions of the Ideal model
North China and Northeast China

North China was before 383 A.D. the center of Chinese civilization in every aspect, especially the western part where the Chinese culture originated. Northeast China has traditionally been the settled land of the northern Chinese since the middle of the 18th century, the beginning period of the Ching, "\( \frac{\text{满}}{\text{汉}} \)" dynasty. Around that period of time, similarly, southeast China was the motherland of those earlier settlers of Taiwan before 1895, the Japanese occupation. 14

A number of common characteristics of the compound houses in these areas can be observed in the typical cases shown in Fig.24 (1), (2), (3), (4), (5), (6), (7), (8), (9) and (10).

First, the central core that is usually one of the variations of the ideal 3-bay model, is manifestly distinguishable from the other parts within each compound.

Second, the expansions of the central core are considerably free. Except for cases (5), (8) and (10), no distinctly dominant or socially encoded rules are found among them, although the regional interpretations of the concentric structure is rather clear. Most of them reveal the vertical transformation of the concentric structure.

Third, in terms of physical layout and space organization, the plans are not as tight as those of the other areas so that there are many small courtyards or open space between houses.

Fourth, those additional houses dispersed out side the central core are pri-
arily built for service functions, or as guest rooms in the front, or sometimes rooms for senior generations in the back.

Fifth, the great variety of specific forms is much more significant than the variety of types. This means that those cases are not differentiated in types but in individual forms, which is manifestly different from the central and the southern types.

14. The historical, cultural, socio-economic and political changes from area to area are understood by reading mainly the following resources:


(3) "An Introduction to Several Conceptions of the Periodization of Chinese History", pp. 5-24 of (1)


Fig. 24. A, B and C, North and Northeast China
Fig. 24.A North China

The variations are:

(1) 

(2) 

Taiyuan, Shansi, Western Region

(1) 圖 102 山西太原普鎮塔院村住宅平面

(2) 圖 97 河南開封市廟楊公胡同王宅平面 Kaifeng, Honan, W. Region

(3) Techou, Shantung,

(3) 圖 96 山東德州市府宅平面 Eastern Region

(4) Chinan, Shantung,

(4) 圖 101 山東濟南市住宅平面 E. Region
Fig. 24.B Beijing (Peking)

The variations are:

Fig. 24.C Northeast China

The variations are:

(5)

(6)

(7)

(8)

(9)

(10)
Fig. 24 (11) and (12) are two typical cases of the cave compounds of west China. Cave compounds spread over the regions of the western part of north China and of the southeastern part of northwest China, located on the upper stretch areas of the Yellow River Valley.

Here, even among the caves of the dwelling, the same position order behind the physical layout is found. This position order among the ancestral caves, the residential caves and the caves for storage and service functions is the same as other compounds in the other areas. It is understood from the formal layout shown on the plans below.
Fig. 24. (13) and (14) are two sketches of the compound house in Inner Mongolia that is located on the northwestern side of north China.

Here, (13) shows the sacred courtyard surrounded by the central house and the two side houses. (14) shows a group of the monks' dwellings of a huge temple-complex of "Nan Ssu" in "Ho-lan-shan", 南寺, 贺兰山.

From (13) the pattern of the physical layout (a) is drawn out and another one (b) is obtained from (14).

Besides, in the case of (14) this group of dwellings is arranged on the grid, (c).
Central China

Central China has culturally become the center of Chinese civilization since the Song dynasty, "宋", about the late 10th century. This area also has historically been in a competitive position with north China in the politics of the empire since the beginning period of the Chin dynasty, "楚", about the beginning of the 4th century, and ever been the dominant area for many long periods of time, for examples, the period of 317 A.D.-420 A.D., the period of 960 A.D.-1279 A.D. and the period of 1368 A.D.-1644 A.D.

More importantly, the Yangtze River Valley has economically become the major financial post of the empire since the 10th century, especially the so-called "Chiang Nan", "江蘇", region consisting of parts of two provinces, the CheChiang, "浙江", province and the south of the ChiangSu,"江蘇", province. They are located about the estuary area of the Yangtze River.

Based upon the above historical developments, a different style of urban civilization from the earlier one of northern China was created during the Song dynasty, 960 A.D.-1279 A.D. New architectural types of the compound houses were also created in order to fit the new urban and local context.

Compared to the northern types, they are, in terms of physical layout, much tighter, better-structured and of a greater variety of types. They are, in terms of function, more efficient, and in terms of locality and social code more distinct from place to place and from class to
class, which made them more differentiated in local types and forms. This characteristic is even more strengthened in southern China.

Fig. 24. F, G, and H, Central China

Fig. 24 (15) and (16) show two typical cases of suburban dwelling, in which the main houses were built for the family members' living and the side houses were set for service functions and storage. The ancestral hall is generally the central hall of the second floor of the central house if it is a two-story house.

Fig. 24 (17) is a typical case of the town houses for the medium family that can be found both in central China and in southeastern China. The transformation clues from the preceding types of Fig. (15) and (16) to this type can be traced through vertical expansions.

Fig. 24 (18) and (19)

Two compounds are presented here: the first one in Shanghai, "上海", (18), and the other one in the county of Guanghan, "廣漢", of Szechuan province, "四川", (19).

Shanghai is the harbor at the estuary of the Yangtze River but Guanghan is in the very upper stretch area of the Yangtze River. However, both compounds share the similar structure that we can see from the plans.
The variations are:

(15) Si County,

(16) ChinChiang, Chiangsu
Central China
Fig. 24.G (18) and (19)

The variations are:

- Wuhan, Hubei
- Guanghan, Szechuan
- Shanghai

Fig. 24.F (17) The variation is:
The variations are:

(20) and (21) are two typical cases of complex compounds showing the vertical transformation that is commonly understood the particular regional interpretation of the lower stretch areas of the Yangtze River Valley in central China.

This transformation pattern is usually employed to build the official and intellectual's residence or the merchant's mansions in urban settlements.

Some of them are huge enough to contain several or numbers of blocks like the districts of the city.

Here, the side houses of (20) are located on the two sides of the central houses but those of (21) are arranged in between the central houses if there is the need of side houses. The pattern of (21) is more often employed to manage the urban dwelling.
Southwest and Southeast China

These areas are actually expansions of central China in many aspects such as in cultural, in economic, in political or in social aspect. The manifest difference from central China is the semi-tropical weather, which has considerably influenced and strengthened the regional interpretations of the concentric structure in these areas.15

These regional interpretations are represented through a series of inter-related types shown in Fig.24.J. Among these cases, both the vertical transformation and the horizontal transformation are found in different contexts. The former usually is found within the townhouses and the later is discovered employed as the rural types. Both finally were brought to Taiwan for the construction of new settlements.

In fact, these types were created in central China, except for those of the Hokka compound, which we can see from the cases presented in Fig.24. F, G and H. The great similarity of socio-economic and political context facilitated similar prototypes with those of central China; but, the particular local characteristics, for example, the weather, strengthened some of the transformation rules that resulted in the southern interpretations of the concentric structure.

15. The relations between the semi-tropical weather and the local forms were mentioned and discussed in the following resources:

(1) "中國住宅概說" by "劉敦桢"

(2) "中國古代建築史" by Liu, Tunchen  p.p. 315-356 and p.p. 9-10,  
"A History of Ancient Chinese Architecture" 1980 Peking

(3) "南方地區傳統建築的通風與防熱"  
by "陸元鼎",  
"Ventilation and Insulation of Traditional Architecture in South China"  
by Lu, Yuan-ting, pp. 36-41, No. 4, Architectural Journal 1978 Peking

(4) "廣東民居" by "陸元鼎",  
"Local Dwellings in Guangdong" by Lu, Yuan-ting, pp. 29-36, no. 9, Architectural Journal 1981 Peking
Fig. 24. I (22) Southwest China

Here is shown one of the typical compound houses of southwest China. Generally speaking, this type is two-stories high, with the ancestral hall on the second floor and with the kitchen on the ground floor.

The spaces of the main house are set for the family members' uses and the side houses are for storage and service functions.

Fig. 24. J (23)-(32) Southeast China

Southeast China was the motherland of early settlers of Taiwan before 1895. These diagrams will show a number of typical compound houses, including those of the Hokka compound, which will be further commented on, in terms of cultural roots, regional interpretations and local transformations, in chapter 3.

The series of Fig. 24 (23), (24), (25), (26), (27) and (32) shows the vertical transformation of the prototype of (23) or (24). Another series of (28), (29), (30) (31) and (32) suggests the horizontal transformation of the prototypes (23) and (24).

Case (31) is a deformation of (28) and the central core of (32) is actually a type of the vertical transformation.

(27) shows a complex type of the vertical transformation that is commonly employed as one type of the town houses.
This typical case of Yunnan province, "雲南", is so-called "I-k'o-yen", "一顆印", in Chinese architecture.

The variation is:

A ancestral hall  S storage and service
B bedroom        D domestic animals
K kitchen        G guest hall
Fig. 24 J
Southeast
China

(28) j T
(23) ts i
(27) 0
(32) 86
(30) 2-Secli4ti W4
(29) (31)
(25) Plan
(22) (30)
(24) Bed~~~s
(20) Enr.&eHl
(21) R
(19) 0--0
(18) -
(17) -.
(16) -78-
The Hokka compound is a peculiar division of the Chinese compound houses, revealing an outstanding type of transformation.

Compared to the central and the southern Chinese, Hokka are believed the true or the original Chinese, historically and culturally coming from the so-called "central plains" of China, "Chung-Yuan", "中京", where is the middle section of the Yellow River Valley in the western part of north China.

Hokka moved from the "central plains" to the eastern part of the North, to the central part of China, the Yangtze River Valley, to the southeastern China and to Taiwan and then, to overseas.

The fact that they are used to preserving their original cultural and social traditions despite differences from the surroundings always brings them conflict with other inhabitants. As a result, the architectural types of their dwellings were created with the most original structure and symmetrical forms. Even a great number of Hokka compounds was found built in the circular structure of concentricity.

Two groups of Hokka compounds will be shown in the remaining figures of the "Regional Variations": 1, Fig.24 (33), (34) and (35), showing the compounds with the structure of concentric squares and 2, Fig.24, (36), (37) and (38), showing the structure of concentric circles.
Fig. 24.K  The Hakka Compounds with the square or rectangular structure

2 layers

3 layers

4 layers

(33) YongTing, Fujian Province

(34) YongTing, Fujian

(35) YongTing, Fujian Province
Fig. 24.K The Hakka Compounds with the Structure of concentric Concentric Circles

(36) 2 layers

(37) YongTing, Fujian Province

(37) 3 layers

(37) YongTing, Fujian

(36) YongTing, Fujian Province
Fig. 24.X The Hakka Compound with the Structure of Concentric Circles

(38) 4 layers

(38) YongTing, Fujian

図 171-1 福建永定客家族族營造樓面 • 剖面
The Concentric Structure and Its Transformations

The concentric structure underlying the physical cores of the compound can be demonstrated not only with the geometric analysis of case study but also derived theoretically from the previously developed structure of the concentric squares. In this section I shall conclude the general theory by discussing the concentric structure of the physical cores and its transformations within the compound.

On one hand, the models are the geometric basis, on which I can see, in correspondence with the cultural cores, the physical cores of the compound by analyzing the cases. Finally, I come to the concentric structure behind these physical cores.

On the other hand, in the theoretical aspect the similar structure can also be arrived at from the pattern of position order, from the synthesis of the ideal models and from the concentric squares. Through these three ways of interpretation we will see the interesting significance of the concentric structure and its transformations.

Fig. 25 shows these three interpretations: (a) is the direct interpretation of the general pattern of position order with the presentations of the places or positions, (b) is the further interpretation of the concentric squares with the presentations of the houses and (c) is the interpretation of the ideal models by overlapping these formal models and centering at the sacred cores. These formal models are individually composed...
by 3-bay-houses, 5-bay-houses, 7-bay-houses, ... , etc., & c.

Here, (a) suggests the origin of the concentric structure: the principle of position, (b) shows after the intervention of space the formal pattern of the concentric squares, in which the spatial modules are introduced. Afterwards, we come to see the presentation of the entire system in (c).

Initially, each formal model is taken out of the general structure of (b); but, each of them can continue growing or can reduce into a smaller ones, in which we see the increase and the decrease of the number of the physical cores and layers. These increases and decreases can be observed in reality by comparing a number of compounds which have different sizes, by observing the growth of the compound or by interviewing with the residents about the growths both of the family and of their dwellings.

Fig. 25
The Concentric Structure of Physical Cores
Transformations of the Concentric Structure

Two types of transformation of this structure can be found: the vertical and the horizontal. Fig. 26 (a) shows different variations of the vertical transformation, in which we can reach different options by employing different houses: 3-bay-house, 5-bay-house, or 7-bay-house.

Fig. 26 (b) also shows us different options of the horizontal transformation. Obviously, there is the third type of transformation as Fig. 26 (c) shows: the combinations of these two.

Generally speaking, we see the transformations of the concentric structure as the result of regional interpretations, in which the regional variations become prototypes for the further selection of the local types in local contexts.
As an example of the regional interpretations, I shall explore the compounds of the Taiwan area in the next chapter, in which we can understand the concentric structure and will arrive at the beginning of the general theory about the architectural typology.

\[\text{(c) Combined Transformations of the Vertical and the Horizontal} \]

![Diagram](image)

Fig. 26
Transformations of the Concentric Structure

The Ideal Site 2.4.8
Ideal Site 2.4.8

To place a compound house in a certain lot of land, people still follow the traditional principles of geomancy to determine its orientation and its location. An ideal pattern of this layout in an ideal physical context can be shown as Fig.27.

In Fig.27, situated at the center is the ideal model with a hill at its back and a pond or a river, providing the water, to its front; moreover, it is much better to have a wide-spread plains in front of the ideal site.16

Within the rules of siting the compound house to local contexts, a great
number of Chinese cosmological ideas has been mentioned and discussed very widely, which can only be considered as part of the existing rules in this research, although I believe that it has been by itself the implicit theory and method for architectural design and planning behind the Chinese empiric tradition of building construction.

North-South Axis

There is a north-south axis which should go through the centers of the central courtyard, of the house 1 and the house 4, or of the gate, and to the top of the hill. Based on this N-S axis, the ideal layout can expand symmetrically towards both sides, the east and the west, or to the back and to the front.

This formal expansion is considerably limited and adjusted by the physical configurations of the site. This physical limit has been one of the major factors in creating the variations of the ideal model and the local transformations.

16. The general principles behind this ideal site has been the most common sense people have in their minds and always try to follow from place to place and from time to time. Naturally, there are different interpretations and transformations in different contexts. Here, the ideal site somewhat is like the model of siting the compound to the reality of physical context. It is in Chinese "feng-shui", meaning wind and water, the geomancy.
2.5. Characteristics

A number of characteristics can immediately be concluded after the previous theory was presented. They are: 1, formality and symbolism, 2, framework and fill-in, 3, models of occupancy and 4, non-monumentality.

Formality and Symbolism 2.5.1

After the theoretical explorations about the physical forms of Chinese compound houses, I come to the conclusion of formality and symbolism.

Fig. 28 shows the symbolic and formal processes of creating the framework, the geometric models, of the compound. They are:
1, identifying the individually particular sacred point between the human being and heaven which comes from the Chinese cosmology,
2, locating the sacred core, depending upon the particular dweller's characteristics,
3, deciding the basically north-south axis,
1, Identification of the Sacred Point between the Mankind and Heaven, Cosmology

2, Location of the Sacred Core

3, North-South Axis

4, the Shrines

5, Position Order, Patterns of Position: $5_1 \ 5_2 \ 5_3 \ 5_4 \ldots$

6, Concentric Structure, General Model of the Compounds

7, Framework, Geometric Models

7 $1 \ 7_2 \ 7_3 \ 7_4 \ldots$

8, Occupancy Models, Territorial Distribution

8 $1 \ 8_2 \ 8_3 \ 8_4 \ldots$

9, Additions and Secondary Physical Elements, Fill-in

10, Variants, Decorations and Social Symbols
4, accommodating the ancestral shrines on the north of the sacred core, 
5, ordering the positions by beginning with the position of the ancestral shrines and centering at the sacred core, in which a series of position patterns are created such as $5_1$, the 1st pattern, $5_2$, the 2nd pattern, $5_3$, the 3rd pattern, ..., etc., & c., 
6, composing the ideal models and their combinations by following the general model of the concentric structure, on which the physical form of the compound house is based, 
7, appearing the framework that is the geometric model resulted from the transformations of the concentric structure, 
8, coming the occupancy of the family members, in which we see the territorial distribution, and 
9, emerging the fill-in of addition and of the secondary physical elements, where we see the power and the territorial expansion or reduction.

Afterwards, the process goes to the 9th of "variants", caused by the individual interventions in the physical systems of space, material and technique of construction.

In those processes before step 8, everything is encoded symbolically, which determines the concentric structure of the physical form. Even after step 8, the social codes and conventions still dominate most decisions.
As consequences of the previously described theory, the houses make a framework of the physical layout, in which we see the ideal model or its transformations and the space pattern behind the framework.

Employed as "fill-in" to this framework, different additions and the secondary physical elements of pavilion, of wall and of gate are attached to the houses as in-betweens.

Both of the houses and the physical attachments together construct the major part of the physical payout of the compound. Fig. 29 (a) and (b) are two types of framework individually showing that the houses structure the framework of the compound and by adding certain formal additions to it we then, see the pattern of the physical layout.
Those patterns of position order in fact, have suggested a number of options for the formal layout of territorial distribution within the compound.

Fig. 30 shows the inter-related locations of different territories formally occupied by the appropriate family members in accordance with their individual status in the family. In correspondence with the pattern of position, territory 1 is occupied by the chief of this family; then, the subsequent order is territory 2, 3, 4, and so on.

Here, (a) is the corresponding pattern of territorial distribution to the 1st position pattern. (b) shows two patterns of territorial distribution, corresponding to the first two options of the 2nd pattern of position order: the vertical and the horizontal.
In Fig. 31, we come to see the formal territorial occupancy and the potential and trends of the territorial growth in reality.

Fig. 31 Occupancy and Territorial Expansions
Non-Monumentality 2.5.4
Non-Monumentality 2.5.4

The growth pattern of the whole system suggested us about the compound houses a non-monumental tradition of craftsmanship and technique, which has been traditionally the Chinese people's attitude to the residential buildings.

With the similarity to a growing life, the compound house was considered as the physical representation of the inhabitants so that the following characteristic was resulted.

First, the model is underlying the physical configuration of the compound like the skeleton of the human body. Second, every addition is a piece of fill-in attached to the model, in terms of the occupier's social status, even most of the time, a piece of decoration as a social symbol, like the attachment of muscle, of nose, or of hair to the skeleton.

However, the model of the compound is determined by the order of position, can only transform within this order and, even the fill-in is encoded mostly by social rules and agreements. These facts facilitate the tradition of craftsmanship and technique.
CHAPTER 3

TAIWAN AREA: A REGIONAL INTERPRETATION

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What To Be Done

This chapter will focus on the general demonstration of the theory by taking the Taiwan area as an example of the regional interpretation. With this example I shall show in reality the specific transformations of the ideal forms and of the concentric structure. Two parts are included in this chapter: the general description of this regional interpretation and the specific local and thematic patterns of transformation.

In the first part, the regional variations of the ideal forms will be described by means of the geometric analysis and the regional interpretations of the concentric structure will be concluded after...
the common regional patterns of transformation are raised and discussed.

In the second part, each local or thematic pattern of transformation will be explored individually and demonstrated with cases. Within these explorations and demonstrations I shall give different examples showing the particular forms of the models and the specific transformations of the concentric structure.

Taiwan As The Example

Due to the frequent shift of the socio-economic and political context in the past 300 years, the physical transformation of the environment in Taiwan has been significantly distinct from those of the other areas in the Chinese mainland. This regional characteristic, plus the peculiar historical and spatial contexts, create my belief that through the study of the traditional architecture of Taiwan, I can achieve a general understanding about the Chinese traditional dwelling environment and can apply the same approach to the study of the other regions in the mainland.

For instance, on one hand, most of the transformation patterns can be found in this area because the various rules have come out of the variety of socio-economic and political contexts and have resulted in broadly different transformations. On the other hand, the traditional peculiarity of settlementship has made the particular regional interpretations of the concentric structure.

Culturally different groups of settlers coming from different regions of the mainland have created different architectural types by imitating those building types of their hometowns. Geographically, a certain number of local types were created or resulted in the particular locality or under peculiar natural con-
ditions of this region, although they still originated from the ideal forms. Socially, a greater variety of architectural types was created for various types of social, economic and political life. As a result, we see the variety of transformation patterns, greater than those comparatively stable areas on the mainland, and realize the distinct regional interpretation.

As one famous Chinese anthropologist claimed "Taiwan as a Laboratory for the Study of Chinese Society and Culture", I believe, this typological research of the Chinese compound houses of Taiwan will be a model for the study of the Chinese architectural typology.

17. Chen, Sao-hsin, "Taiwan as a Laboratory for Study of Chinese Society and Culture" in
3.2 Historical and Spatial Contexts

Since 1945, the whole area has been controlled by the Nationalist Government while the Mainland has been occupied by the Chinese Communists.

Historical Context 3.2.1

1624-1661 The Netherlanders occupied the southern part of Taiwan and the Spaniards the North.

1661-1683 These islands were under the control of the Kosingka, "國姓爺", a military figure of the Ming dynasty preceding the Ching dynasty.

1683-1895 The Chinese Ching Government ruled the entire area.

1895-1945 Japanese occupied the territories.

1945- The Chinese Nationalist Government regained the lost territories in 1945, right at the end of World War II.
Taiwan inherited the dominant cultural tradition from China, during the periods from 1661 to 1895 and from 1945 to the present, major cultural influences from Japan before the 60's, and from the U.S.A. after the beginning of the 60's, when the present government was quickening the pace of modernization.

Fig. 32, on the left-hand side of this page, shows the spatial relations between these islands. They include Taiwan island, the Penghu islands and Chinmen island, located on the southeastern coast of the Chinese Mainland.

The locations of the cases that will be presented in the section of 3.5 are also shown on the map of Fig. 32.
3.3 Social Aspect

Before 1895

In the middle of the 17th century, groups of Chinese with their cultural tradition began to immigrate regularly from southeast of the Mainland to this primitive island "Formosa", named by the Dutch. In the beginning they traded with the natives, then cultivated the land and began to transplant the Chinese culture on this island visibly by embodying the environmental image of their hometowns when they were processing the construction of new dwellings. Apparently, the imitation of building type was the easiest way of doing it.

Because of the Ching Government's limitation
policy on immigration to Taiwan, most of the developed or developing settlements had an incredibly unbalanced sexual rate full of male settlers during that period of time. The lack of a sufficient number of women and children suggests that there existed an insufficient number of families which should have been crucial in settling down the social life and making the society progress.

Due to the above primary concern, not many formal compound houses were built during the beginning of the immigration except for some official houses and temples.

In 1760, the Ching Government finally relaxed the limitation policy on immigration, allowing the male migrants to take their families together to the island. Since then, till the end of the 18th century, the population has steadily increased, the society becoming stable and the western plains of this island were getting more broadly cultivated.

The social order, political control and economic system had settled down before the 80's of the 19th century. At the same time, due to the social capability, most of the traditional houses, villages, towns and cities were built during this period of time by imitating those that had already existed for thousands of years on the Mainland.

1895-1945

Then, in 1895 came the Japanese invaders who occupied this island and the Penghu islands till 1945. During that period of time, Japanese were eager to modernize their country by following the western model. They brought into the inhabitants' life and the environment of
Taiwan certain crucial influences that were resulted from the conflict and the compromise among Chinese, Japanese and Western cultures.

Because of Japan's westernized modernization, the tremendously fast and radical shift in every aspect was introduced to this island, especially in the political and economic aspect, although some Chinese officials had begun the economic modernization since the middle of the 19th century.

The new political situation changed mostly the facades of the buildings, whether the old or the new ones, and brought into the island a great number of institution buildings designed in the western styles mainly of the Renaissance and of the Baroque.

Politically for the purpose of destroying the image of the Chinese tradition and economically for the industrial construction, both the appearance and the structure of towns and cities were changed totally. The western idea in city planning was dominantly introduced to the building of new cities and to the renewal of old towns.

After 1945

Moreover, since 1945, while the traditional feudalism has been existing behind the communist system on the Mainland, the Nationalist Government's policy of economic modernization has again pushed the island into a totally new situation in every aspect, having created the well-known "economic miracle". This recent economic development in Taiwan has brought the greatest deal of destruction and change to the physical environment, especially in towns and cities. A great number of traditional houses and old
settlements has been towed down for new buildings and for new urban designs and housings. Fortunately, in the countryside still remain some old houses and villages that have provided me the fundamental resources of the case study in this research.

Through the physical transformations, described by means of geometric models, and in the implicit changes of rule, resulted from the frequent social, political and economic shifts, we will see how human beings manage in correspondence with their society the dwelling environment. This theme will be explored in further in the following discussions about the regional interpretation and the local and thematic patterns of transformation.

18. 陈绍馨，"台湾的人口变迁与社会变迁"，
    Chen Sao-hsin, "The Demographic and Social Changes of Taiwan",
    (i) Section 10, "Sexual Rate", pp.93-177 and pp.168-171,
    (ii) "臺灣的家庭、世系、與聚落型態 ",
    "The Family, Ancestry and Settlement Forms of Taiwan", pp.443-485

19. The same as note 7, on page 19.
3.4 Regional Interpretations

I discovered certain regional interpretations of the concentric structure and local patterns of transformation while I was applying the geometric models and the transformation rules to reality.

In this section I shall explore these regional interpretations of the concentric structure by explaining three aspects. The first is the interpretations of the ideal forms, in which I will discuss the regional variations on the ideal models, including its reductions, by means of the geometric presentation of the bay and the alley. The 2nd one is the expanded patterns of the ideal models, in which I will discuss the major transformation rules of the models. The third aspect is the regional transformations of the concentric structure that will be presented as the theoretical demonstration of the regional interpretation by concluding the first two explorations.

Afterwards, I will give a brief explanation about the combination of the models, in which it will be shown that tissues are composed by different compounds. They all begin with the ideal models and then, follow the expanded patterns to spread out.

Finally, in the next section of "Demonstrations of Cases for the Patterns of Transformation", various cases will be raised to demonstrate the regional interpretations of the ideal forms and to show the relations between transformation
patterns and local themes. We will then see in reality the evidence of the general theory. This is in this thesis the last step of this theoretical approach to the ideal forms and the transformation rules of the compound houses.

Variations on the Ideal Models 3.4.1

The Ideal 3-Bay Model and Its Reductions

Fig. 34 shows the ideal 3-bay model and its reductions that have been found in this area. The difference between them is the different numbers of the houses that make each of them. However, the ancestral house, that is the central house 1, is preserved within each model.

There are only two ways of reducing the ideal model: by taking away the side houses, sometime by removing them from the formal positions to the in-between places of the central houses, Fig. 34(b), or by removing the 2nd central house, that is house 4, sometime in stead of a gate, as Fig. 34(c) shows.

Fig. 34(d) shows the combination of
the two reductions, where house 4 is withdrawn and the two side houses of house 2 and 3 are removed from the formal positions to the both sides of the front of the ancestral house. Fig.34(e) shows the last step of the reduction, only leaving the ancestral house on the 1st position.

The Alley and The Bay

The four houses of each ideal model are connected to each other tightly, which shape not only the formal layout but also the original space pattern underlying the geometric model. The alley and the bay are here the two kinds of space that can be applied to varying the original space pattern.

Fig.35 The Alley and The Bay

Usually for horizontal movements the
alley is attached to the front or to the back of each central house, covered with the same roof. For vertical movements it is also attached to the front of a side house or arranged between compounds, Fig. 35(a).

The bay also can be added to the front or to the back of a central house or to the front of a side house, when there is the need of more space between those houses. Fig. 35(b) shows the attachments of bay-space between the houses.

The difference between the bay and the alley is the width. The alley is only about 1/4 to 1/5 wide of the width of the bay and generally covered with the same roof of the central house or of the side house that it is attached to. The bay is employed to create side courtyards or to increase additional rooms to the side houses or to the central houses, shown in Fig. 35(b).
The Variations on the The Ideal Model

On the geometric basis of the alley and the bay, the variations on the ideal 3-bay model are shown in Fig. 36, where "A" shows the 1st group of the variations that result from the spatial intervention of the alley, "B" shows the 2nd group of the variations that result from the other spatial intervention of the bay and "AB" shows the 3rd group of the variations that result from the combined intervention of both.

The rules of the interventions of spaces, including the alley and the bay, are: 1), the two kinds of space can be attached individually or together to the front or to the back of each house and 2), the two spaces must be symmetrically added, either individually or together, to the front of the two side houses.

The diagrams of Fig. 36 are drawn, in terms of the 3-bay-house; also, another division of variations on the 5-bay-model can be worked out in terms of the 5-bay-house, and so on.

Reduced Variations on the Ideal Model

The same rules of transforming the original space pattern of the ideal 3-bay model are applied to transforming the reduced models, in which numbers of reduced variations on the ideal model are created.

These variations of the reduced 3-bay models are also drawn, in terms of the 3-bay-house, in Fig. 37. They are again divided into 3 groups of variations in terms of space intervention: "A", the intervention of the alley, "B", the intervention of the bay, and "AB", the combined intervention of both.
Fig. 36 Variations on the Ideal 3-Bay Model

Group A: Resulted in the Intervention of The Alley

Group B: Resulted in the Intervention of The Bay

Fig. 37 Reduced Variations on the Ideal 3-Bay Model

Group A

Group B

Group AB: Resulted in the Combined Intervention of the Alley and the Bay.
The diagrams of Fig.38 show different expanded patterns of the 3-bay models, including the ideal model and its reductions, revealing the regional transformation rules.

These patterns of transformation are classified into five categories in terms of the type of the central core of each pattern.

Within each category, three ways of transforming the central cores can be recognized based on the discussions about the concentric structure and its transformations in 2.4.7. They are the vertical, the horizontal and the combination of both.

A, B and C Categories of Expanded Patterns
These five categories of expanded patterns are A, B, C, D and E, shown in Fig.38. Category A includes those patterns derived from the ideal 3-bay model. Category B includes those patterns derived from the 1st reduction of this ideal model, \[ \begin{array}{c}
\hline
\hline
\end{array} \]
and category C consists of those types developed from the 2nd reduction of the ideal model, \[ \begin{array}{c}
\hline
\hline
\end{array} \].

Within each of these three categories the three types of transformation are represented in Fig.38 with, for example, \[ \bar{A}h \]
\[ B_1h \]
\[ C_{vv} \]
\[ C_{h} \]
\[ C_{v} \]
\[ C_{v} \]
\[ C_{v} \].

Here, "v" represents the vertical transformation by repeating the central core, that is the employed model, in the front or in the back of the original model. "\[ \overline{v} \]" represents the vertical transformation by increasing central houses in the front or in the back. "\[ h \]" represents the horizontal transformation by repeating the form of the employed model beside the central core. "\[ \overline{h} \]" represents the horizontal transformation by increasing side houses to both
sides of the central core that is the employed model. These signs will also be used in the discussions of the following texts.

D Category of Expanded Patterns

D category shows the grid composition of a certain particular type of the reduced models, in which the pattern can either be a horizontal collection of vertical transformations or be a vertical collection of horizontal transformations, or also can be a collection of combined transformations.

According to what I have understood, visited and recorded within my field work, this pattern mostly begins with the horizontal transformation. Here, the selected model is employed as the unit to compose first the horizontal line; then, beginning from there, the second horizontal line is created vertically behind the first line.
After it becomes a small block area, containing the grid pattern, it then, is manipulated as a tissue element to structure the physical layout of a village. However, the vertical interpretation of this pattern, \( D_v \), is also available as the case of Wang Village, Chinmen, Fig. 59, shows.

Category \( E \) shows the system that is composed by those types derived from the combined models of both reduction 1 and reduction 2, \( E\hat{h} \) and \( E\hat{v} \). Here, reduction 1 is a 3-bay model and reduction 2 is a 5-bay model: \( + \). The compositions of them then become the 2nd prototypes from each of which the horizontal transformation of \( E\hat{h} \) begins and a series of new types is derived. However, the vertical transformation \( E\hat{v} \) or \( E\hat{v} \) can be seen only through the expansions of the prototype or through the comparison among the central parts of these types.

The conclusion that within most of the patterns horizontal transformations are dominant can be made after these expanded patterns are presented as a result of this exploration. This will be demonstrated...
in terms of geometry more specifically in the next section.

Based on the diagrams of those expanded patterns drawn in Fig.38, the demonstrations of specific transformations of the concentric structure are given by means of the graphic presentations of Fig.39, shown beside Fig.38. These graphic presentations demonstrate the specific concentric structure underlying each expanded pattern, which reveals a particular system of typology.

Afterwards, types are distinguished within each system by recognizing 1), the model that is usually the central core of the physical configuration, and 2), the pattern of transformation, for example, $v$, $\bar{v}$, $h$, $\bar{h}$, or a combination, and finally, by seeing how far the transformation has proceeded from the geometric origin that is the central core.
Interpretations

Fig. 39.A shows the specific interpretations of the A category on the concentric structure, in which horizontal transformations are discovered mostly.

Fig. 39.C shows the specific interpretations of the C category on the concentric structure, in which vertical transformation $v$ is employed to create the central part of a compound. After the central part is created, the horizontal transformation of $h$ begins and continues till the destination of family growth, (8), or the other one of $h$ begins by repeating the layout of this central part horizontally.

Fig. 39.B shows the specific interpretations of category B on the concentric structure, in which vertical transformations $v$ and $\bar{v}$ are employed to create townhouses or the central parts of rural or suburban compounds. Beginning with this, town tissues are created in the horizontal transformations by repeating the vertical patterns of (9), or a rural or suburban compound is created by following horizontal transformation $\bar{v}$, Fig. 39.B (10).

Fig. 39.D shows the specific interpretations of category D on the concentric structure, in which the grid underlying the transformation patterns is discovered. The center of a composition here is usually the ancestral compound if it is a clan village as Fig. 59(a) shows.

Fig. 39.E shows the specific interpretations of category E on the concentric structure, in which systematic combinations of the vertical and the horizontal transformations are well-structured.
In Reality

The conclusion that horizontal transformations are dominant is obtained also on the basis of the following facts resulted in my survey and investigation: 1), the horizontal transformation types of (1), (2), (3) and (10) are the dominant types in rural areas, 2), the combined transformation types of (8), (13), (14), (15), (16) and (17) are second most frequently used in reality, they are still largely horizontal types, and 3), in pattern (11), the horizontal transformation is the dominant as well.

The above facts should be explained as regards the understanding to this regional interpretation. Very often in rural and suburban areas, the vertical transformation types are only employed to create the central part of a compound as the combinations of (8), (10), (14) and (16) show.

After the central part is created, the compound begins to expand by following the horizontal types of transformation till the destination of family growth.

In fact, the central part of each pattern is always one of the ideal models, one of the reduced models, or one of the vertically expanded models; then, beginning from there, the horizontal transformations are followed by adding side houses to the central part, or by increasing vertically expanded patterns on both sides of the original model.

Discussions on Issues About the Transformations of the Concentric Structure

In those graphic demonstrations, we see naturally three interpretations of the concentric structure: the horizontal, the vertical and the combined patterns of transformation.
Fig. 39 shows the formal pattern of the concentric structure. By comparing the specific interpretations of categories A, B, C, D and E, shown in Fig. 39, with this formal pattern, some issues about the concentric structure and its transformations can be discussed and understood.

First of all, the types preserve the central core that is a physical model of either one of the ideal models or one of the reduced models and must contain the sacred place and the first layer of houses. This proves the Chinese ideal of embodying the ideal family structure by applying the ideal forms to the physical construction of a compound house in reality.

Second, the regional interpretations of the concentric principle arise, when the central core is ready to expand, and continue guiding the transformations of the structure of form during the subsequent expansion stages.

Afterwards, it is significantly manifest that the concentric structure exists from pattern to pattern in Fig. 39, representing the cultural and social theme of the position order underlying the relationships among family members, although it may be reached through various ways of interpretation.
A number of ways of composing the models have in reality been found to shape settlement tissues. In terms of the employed models and the geometric growth of the models, the tissues can be classified into at least five categories of combinations, shown in Fig. 40. They are (1), the dispersed, (2), the linear and double linear, (3), the triple linear and grid, (4), the town tissues, and (5), the urban tissues.

(1) is actually composed by scattering huge compound houses on field. (2) is a linear or a double linear collection of compound houses. (3) is a collective configuration of numbers of compound houses that are arranged in a compact form of, sometime, the rigid grid or of, the other time, the mixed complex of compounds, de-
pending upon the local context of society, economy and natural environment. (4) is the tissue model that used to be employed as one of the physical elements for constructing the formal layout of a town or a city. (5) shows one example of the tissues that are used for constructing residential settlements in a town or in a city.

Afterwards, Fig. 41 shows three typical cases of village tissue in Taiwan, which demonstrate different combinations of compounds.

There is a great variety of layout and form within each group of combinations. This variety not only can be derived from the models of the compound houses by following certain transformation rules, but also can be observed in reality.

With these diagrams, I only show the general forms of the tissue patterns, which...
will give the reader the idea of how the models of compound houses can be applied to the creation of the tissues. These categories of tissue patterns can be the basis for a specific research into settlement typology that goes beyond the scope of this thesis but will be introduced in chapter 4, conclusion.
20. In the section of "2.4.7, The Concentric Structure and Its Transformations", I have already given the general description about the concentric structure and its geometric transformations. Here, based on both the fieldwork and the two previously mentioned explorations of the ideal forms, a demonstration of the regional interpretation on the concentric structure will be given.


- In terms of form, the village tissues are divided into three categories in this book: the scattered, the linked and the compact. However, this is a general classification in geography.

3.5 Demonstrations of Cases for the Patterns of Transformation

After the regional interpretations of the concentric structure are discussed, different cases will be given to demonstrate the expanded patterns of transformation in this section. In the following contexts, the cases will be shown in correspondence with the classification done in 3.4.2. They are the A category, the B category, the C category, the D category and the E category of transformation patterns.
Formal Layout 3.5.1

Fig. 42 shows the formal layout of the most common rural compound houses in the Taiwan area. They are mostly those types contained in category C. The territorial occupancy and social uses underlying these types is understood on the theoretical basis of 2.5.3, "Occupancy". This territorial distribution also can be applied to the other types.

In Fig. 42(a), this formal layout preserves the ancestral hall in the central bay of the central house, "A" on the plan, and the parents' private space in the left-hand bay, "B" on the plan, of the same central house, when the children are not yet married. If the children are married, the first son and his wife are supposed to be

A Ancestral Hall
B Parents
C 1st Son
D 2nd Son
E 3rd Son
F Domestic animals
G Storage, Granary
K Kitchen
L Living Spaces

The parents are taking charge of family affairs, when the children are not yet married.

The 1st son and his wife take over the family after they get married and are capable of managing it.
The order of space, or of place, among the territories this compound is A, B, C, D, E, F and G, shown in Fig.42(b). In correspondence with this order, the family members occupy, in terms of the position order between them, the appropriate territories. For example, after the parents retire, the 1st son and his wife take over the B territory, the 2nd son and his wife occupy the C territory, the 3rd son and his wife occupy the D territory and the 4th son and his wife in the E territory, shown as Fig.42(c) does.

In this case, there is only one kitchen taken care of by the 1st son's wife when the family members are still willing to live together and share their living material. Whenever they decide to divide the

---

<image>

**Fig.42(b)** the Pattern of Territorial Distribution Within the Formal Layout of Compound Houses

Order: A, B, C, D, E, F, G

- Sacred Place, for worships to the gods and heaven, and as the threshing floor for farmwork.

**Fig.42(c)** the Position Order Within the Formal Layout
family, owning their individual parts of this sharing situation, the other sons' families have to set up their own kitchens within their individual territories.

Therefore, the territorial distribution within a compound house can be understood by dividing, in terms of the locations of kitchens, the entire territory into a number of sub-territories. The relationships between them reveal the pattern of territorial distribution. This will be seen in the following cases.

22. It is a common sense in Chinese ethics about the relations between family members that the eldest son is supposed to be treated as the father and his wife is supposed to be treated as the mother by all the other family members after their parents are not able to take care of the family. This is "oldest-brother-as-father", "長兄為父", "chang-hsiung-ju-fu", and "oldest-sister-in-law-as-mother", "長嫂如母", "chang-sou-ju-mu". They also are responsible for taking care of all the other family members as the father and the mother do.

23. There are many terms in Chinese about the family divisions such as "fen-chuan", "i-chuan", "i-yen", "fen-yen", "fen-t'sai", "i-t'sai", "pien-chi", "hsi-ting" and "fen-chu", "分餐", "分羹", "分餙", "分烟", "今财", "異財", "別籍", "析產" and "分居". Most of them are related to the sharing and dividing of the kitchen.

This category of transformation patterns includes those derived from the ideal models, shown on the left-hand side of this page. In the next pages one case is presented to demonstrate the horizontal transformation \( \bar{v} \). In Fig. 55, on page 151, vertical transformation pattern \( \bar{v} \bar{v} \) and horizontal transformation pattern \( \bar{h} \bar{h} \) are presented.
Fig. 43  Shih Compound, A Case of Horizontal Transformation Pattern in Category A.

Built in 1870
Central Core: An Ideal 3-Bay Model
Transformation Type:  h
Concentric Structure:
Fig. 43(a)  Shih Compound, A Case of Horizontal Transformation Pattern in Category A.

Building Type:

![Diagram of Shih Compound]

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-130-
This category of transformation patterns includes those derived from the 2nd reduction of one of the ideal models, shown, for example, those of the ideal 3-bay model, on the left-hand side of this page.

In the following pages three cases are presented to demonstrate individually the horizontal and the vertical transformations. Two of them are farmhouses, showing the horizontal expansions, and the other one was an official compound complex, showing the vertical expansions inside a compound and the horizontal expansions by increasing the number of compounds.

Fig.45 shows a compound case that was occupied in 1974 by 4 brothers and one sister without parents but with their own
families. Here, we see three generations living together sharing the compound. The family structure is shown in Fig.45(c) in the same way of presenting the ancestry lines, described in 2.3.1.

The territorial occupancy is shown in Fig.45(b), in which we see the formal increasing of territories, from the last step of Fig.43(b) to Fig.45(b). This increasing shows us the horizontal expansions of the rural compound houses in Taiwan.

This territorial distribution also demonstrates the statement that the spatial relationships between kitchens reveal the pattern of territorial distribution. In Fig.45(b), we see there is an expanded space for kitchen within each territory.

In Fig.45(c), which shows the family

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**Fig.45(a)** Wang Compound, A Case of Horizontal Transformation Within Category C.

**Fig.45(b)** the Pattern of Territorial Distribution

Order: A, B, C, D, E and F.
structure, the 1st brother's 1st son, 1.1, was married and incharge of the 1st family so that he and his wife were occupying the $B_1$ space in stead of his parents. The parents were living in the $B_2$ space together with their third son, 1.3, who was the youngest and not married yet.

The second brother was still in charge of his own family. He and his wife were living in the $C_1$ space and their unmarried son, 2.1, in the $C_2$ space. The sister and her husband were also living in the same compound but occupying the last place, the fifth ordered territory $F$. 

Fig. 45(c) Family Structure

Fig. 45(d) Building Type
Fig. 46 shows another more complex case of horizontal transformation in category C, in which we still see the similar formal structure and can outline, in terms of the locations of kitchens, the pattern of territorial distribution, Fig. 46(b).

Here, territories F and G are further divided into two sub-territories, F₁ and F₂ and G₁ and G₂, in which each territory still contains its own kitchen.
Fig. 47 shows the only existing compounds of one of the most powerful officials during the Ching dynasty, which I have found in fieldwork in Taiwan. We see here the dominance of the vertical transformation of "v" within the compounds and the dominant horizontal transformation of "h" within the tissue. Four compounds are arranged together horizontally. Three of them are vertical transformation patterns of either the 1st, \( \text{\textsuperscript{1}} \), or the 2nd reduction, \( \text{\textsuperscript{2}} \).

In Fig. 47(a), A is the ancestral compound, containing the offices and the ancestral temple. C was the earliest compound of this family. B was the major compound of this complex, occupied by the official and his descendants, while compound D was attached to the first three lately for the second son, who was the official's brother, and his family to live.

The Front Pavilion of the Second Central House of Compound B of the Lin Family Mansions of WuFeng, Taichung, Central Taiwan
Fig. 47(a) Lin Family Mansions, WuFeng, Central Taiwan

A Ancestral Compound
B Major Compound
C Earliest Compound
D Attached Compound, for the 2nd brother and his family.

Built during the period of 1851-1880's-1893

Central Cores:
A: Reduct. B: Reduction 2
1 of 7-Bay Model
C: Reduct. 2
D: Ideal 3-Bay Model
Fig. 47 Lin Family Mansions, WuFeng, Central Taiwan
A Complex of Vertical Transformation Patterns Within Category C.

Building Type:
(Compound B)

Concentric Structure, Cores and Layers:
This category of transformation patterns includes those derived from the 1st reduction of one of the ideal models, for example, those of the ideal 3-bay model, shown on the left-hand side of this page.

On the left, (b) is followed to build townhouses, in which three types of transformation are shown, constructed individually by one-bay-houses, two-bay-houses and three-bay-houses.

(c) is employed to build urban settlements, in which the vertical transformation patterns of one particular reduced model, $\mathbb{F}_3$, is followed. (a) shows the combined transformation of the vertical and the horizontal patterns. Within (a), the central parts of the combinations are vertical patterns and the other parts of

\[ -138 - \]
each are horizontal expansions of the central part that contains the central core of the compound.

Fig. 48 shows a rural compound of category B, where ever lived 18 families in 1960's.

The building type of this compound can be interpreted as Fig. 48(c) shows. The core, that is the 1st reduction of the ideal 3-bay model, here is the ancestral compound where accommodate the ancestral shrines for all the families. This expanded pattern suggests the horizontal transformation by attaching side houses layer by layer to the central core. Four layers are discovered in this case.

Fig. 48(b) shows the similar pattern of territorial distribution with those of the previous cases of category C. This pattern is again worked out in terms of
the locations of kitchens.

Fig. 48(a) Liu宅, 新埔
Liu Compound, Hsin-P'U, North Taiwan
A Case of Horizontal Transformation Pattern Within Category B.

Built in late 19th Century.
Central Core: Reduction 1 of the ideal 3-bay model, [III].
Transformation Type: Bh
Concentric Structure, Cores and Layers:

Building Type, Fig. 48(c):

Fig. 49 shows a typical collection of one-bay-townhouses. Here, traditionally the ancestral hall is the hall of the second, or of the middle, central house, or is moved up to the front room of the second floor or, sometime, to the rear room, depending upon the orientation of the house or the geomancy rules. The front hall of the ground floor is generally used as the shop if this is a merchant family; otherwise, as the guest hall.

Both when this is a merchant family and when the rear edge of the house is open to another street or alley, generally speaking, the shop is in the front, facing the commercial street, and the back side is used as the residential entrance.

Every townhouse is a variant of the vertical pattern both in depth and in highness. Fig. 50 shows another typical 3-stories high townhouse in Lukang, "鹿港", another old city in central Taiwan. In this case, we see the vertical transformation of the bay in the 3rd, the upward, dimension.
Fig. 49.
Taishui, North Taiwan
A City-Tissue of Combined Transformation Pattern Within Category B.
Fig. 49. Tanshui, North Taiwan

A City-Tissue of Combined Transformation Pattern Within Category B.

Built before 1870 A.D.
Central Core: the Sacred Core, One-Bay-Space.
Transformation Types: v then, h.
Building Types:

Fig. 50. A Case of One-Bay-Townhouse in Lukang, Central Taiwan
Fig. 51 Ting Compound, Lukang, Central Taiwan

A Case of Three-Bay Townhouse With the Vertical Transformation Pattern in Category B.
By examining this case, Chinese people's spiritual attachment to the cultural theme is understood. This attachment has been the dominant factor in creating various types of the Chinese compound houses.

In this compound, the three-bay-house is the most elemental volume employed to constitute the framework of the physical layout. The front house is, in terms of bay, divided into three shops owned individually by the three brothers of this family. However, they still share the rear half of this compound, including the central that is the 1st reduction of the ideal 3-bay model and where the ancestral hall is contained. The building type is shown in Fig.51(b).

Besides, the residential entrance is in the back of the compound, opened to a residential area.
Fig. 52 AnPing, Tainan, South Taiwan
A Case of Vertical Transformation Pattern Within Category B.

Fig. 52 shows two neighboring compounds in the residential area of Tainan, the oldest city in Taiwan. Fig. 53 shows a residential tissue of Anping, the oldest fishing settlement and, at the same time, used as a sea port in south Taiwan. This tissue is constructed by "L-shaped" compounds.

Transformation Types: Bv

24. This "L-shaped" type is also one of the geometric reductions of the ideal 3-bay model. They have also been very commonly discovered both in my fieldwork in Taiwan and in other research documents about the other areas in Chinese Mainland. The classification of L-shaped compounds is made in "An Outline of Chinese Houses", -146-
Fig. 54 Lin Family Compounds, PanChiao, North Taiwan

A Case of Merchant Suburban Compounds, with the Vertical Transformation Pattern, V, of Category B.

Fig. 54(a) shows parts of a huge compound-complex owned by the richest merchant of north Taiwan during the late period of the 19th century.

Two compounds are arranged together side by side, sharing the in-between side houses. The axis here is tremendously strengthened by locating 5 layers of central houses on the almost north-south orientation.

The oldest generations lived in the nearest two central houses; at the other end,
the front central house dwelled the servants, guards and guests, and the front side-houses were used for public and service functions.

The central part lived the primary family members and their own families, men and boys in the left-hand side-houses and women and girls in the right-hand side-houses. The chief of the family and his brother lived in the central core, that is an expanded model of the 1st reduction of the ideal 3-bay model. The chief and his wife occupied the left-hand half and the brother and his wife in the right-hand side, as Fig. 54(d) shows. This is again a typical pattern of territorial distribution, revealing the same model of occupancy discussed in 2.5.3.

The building type is analyzed in Fig. 54(e), in which we see the geometric syntheses of this compound-type.
Fig. 54  Lin Family Compounds, PanChiao  
North Taiwan  

A Case of Merchant Suburban Compounds, with the Vertical Transformation Pattern, v, of Category B.
Fig. 54  Lin Family Compounds, PanChiao, North Taiwan
Fig. 55 shows a typical but destroyed huge complex of official compounds, built in the late 19th century. This case reveals the combined employments of Transformation patterns of categories A, B and C.
In this section I will demonstrate the 4th category of transformation patterns by giving the local examples of Chinmen.

Chinmen is an island much nearer to the Mainland than to Taiwan, of which the architectural types of compound houses are very inter-relating to each other, which reveals the self-contained systems of typology on this island.

The selected prototypes of this local transformation are reduction 1, $\overline{\overline{1}}$, and reduction 3, $\overline{3}$ or $\overline{3}$, of the ideal 3-bay model.

Fig. 56 shows the island of Chinmen and locations of villages.

Fig. 57 presents the local transformation patterns of the selected reduced models. These patterns reveal the local
systems of typology, in which the associations and distinctions between types can be understood.

Afterwards, numbers of cases of compounds are listed in Fig. 58 to demonstrate the local patterns of transformation. Finally, a typical case of vertical transformation, Dv, within this category is presented in Fig. 59, Wang Village, a clan village of Chinmen.

Fig. 56 The Chinmen Island, Locations of Villages
Fig. 57
Local Transformations of the Chinmen Island,
Transformation Patterns of the Selected Models.
Linear, beginning with horizontal transformations.

Compact, rigid grid.

Fig. 57(b) Combinations of Compounds
One Layer of Central House

A typical San-ho-yuan in Kinmen

1. FAMILY ALTAR
2. PARENTS
3. BOYS OR GIRLS
4. KITCHEN
5. STORAGE
6. COURTYARD
7. ENTRY

Dou-men Chen's house  A variation of San-ho-yuan
35 西壇 石頭三合院，正房左右各突出一小屋頂用臨時收藏平日牌匾之用。

Hetpu a San-ho-yuan constructed with random stones.

澤邊 立房用平頂
並加建外塢牆，但仍
由主要大門進入

Pu-pien
A variation of San-ho-yuan
with flat roof wings and
Hu-long
Chou’s house. An arcaded pavilion on the upper floor.

This house in Ou-tsouh combines two basic house forms, so as to best utilize the given space for the special requirement of the family.
Two Layers of Central Houses

Three-Bay Models

1. FAMILY ALTAR
2. PARENTS
3. FIRST SON'S FAMILY
4. KITCHEN
5. COURTYARD
6. HALL
7. SERVANTS
8. STORAGE

A typical Syh-ho-yuan

(12) (13) (15) (14) (16)
Two Layers of Central Houses

Transformations of The Three-Bay Models

The brick molding has been emphasized in a smaller house.
Two Layers of Central Houses
Transformations of The Three-Bay Models

(22)  

(23)  

(24)  

(25)
Two Layers of Central Houses

Five-Bay Models
Three Layers of Central Houses
Combinations of Compounds
Fig. 59  Wang Village, Chungpao, (d) Chinmen

Built before the end of 1920's

Building types:

Compact Combination,
Wang Village, Chungpao
Wang Village, Chungpao, Chinmen
A Clan Village with the Vertical Transformation Pattern, Dv, of Category D.

This is a clan village consisted of 18 compounds that were designed and planned in 1893 and finished before the end of the 1920's.

The builders and designers were from the Fujien province, 福建, the major province where the Chinese settlers of Taiwan came from before 1895.

The material of construction was mainly from the Kianghsi, 江西, province in the inland of central China.

One of these 18 compounds is the ancestral temple, the "A" on the plan of Fig. 59 (a), and another one is the family school, the "S", right in front of the ancestral compound. There is the house-size courtyard between them for the villagers and those descendents who came back to worship.

The other residential compounds are arranged around this family center. The fields are around the village or dispersed in the surroundings.

This is one of the typical layouts of Chinese villages in the Taiwan area.

With regard to the "idea site", there are the hills on the back of the village, the sea in front of the village, about 200 meters far away, and the great plains of white sand between the sea and the village.
In order to fit the physical context by following the geomancy rules, the adjusted orientation was determined on the north-west through the south-east direction.

Three types are found among these 18 compounds, shown in Fig.59(d) on page 165. Fig.59(b) shows the spatial organization within this village. Fig.59(c) shows the layout related to the ideal site.
Fig. 59(a) 王家村，中堡，金門
Wang Village, ChungPao, Chi-men
A Clan Village Containing the
Vertical Transformation Pattern, Dv, of Category D

A Ancestral Compound
S Family School
The others are residential houses
and additional houses for storage
and service functions.
Fig. 59. (b) Spatial Organization
Wang Village, Chungpao, Chinmen.

There are alleys between rows of compounds.
The types of this category are systematic combinations of reduction 1, that is a 3-bay model, and reduction 2, that is a 5-bay model.

Three common cases are presented in order in the following figures of 60, 61 and 62.
Fig. 60 Ancestral Compound, Liu Family
Wukou, Pingtung, South Taiwan

"劉家廬", "五溝"

Built in late 19th century
The middle house is the ancestral house while the others are used for residence.
Central Core: The middle house and the sacred place in front of it.

Layers: 2
Fig. 61 陳家大廈，秀水
Chen Family Compound, Hsiushui, Central Tai Taiwan

Built in 1846 A.D.
The central core is used as the ancestral compound.

Layers: 4
Building Type:
Hsiao Compound, Chiatung, Pingtung, South Taiwan

Built in late 19th century

Central Core: A Vertical Transformation Pattern of Category B, derived from reduction 2.

Building Type:

Fig. 62(a) 蕭宅, 佳冬
Hsiao Compound, Chiatung, Pingtung, South Taiwan

Built in late 19th century

Central Core: A Vertical Transformation Pattern of Category B, derived from reduction 2.
Fig. 62(b) Hsiao Compound, Chiatung, Pingtung, South Taiwan
Chapter 4
Conclusions

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4.4 Non-Residential Typology, An Approach To Design Methodology 181
4.1 Implications for Further Research

A number of immediate further researches after this thesis will be explained in the following texts.

The first is obviously, after the preliminary theory was presented in this thesis, the research into a general theory of typology in architecture. Included in this research are the study of house typology, the study of typology on higher environmental levels of form and the study of other building types such as the temples and the institutions that include the official buildings, the Confucianist schools and other public buildings, as they relate to the residential typology.

The final task of the study of house typology is to establish transformation systems of house types, which are implied in the geometric models and the local transformation patterns of this thesis.

As a matter of fact, the establishment of the typological systems and the further study about the local and thematic transformation patterns are only partially presented in this thesis and must be supplemented in the future.

Another research on higher environmental levels of form leads to the field of settlement typology, by which I mean the typological study of villages, towns and cities on the basis of house typology that is done primarily in this research.

In addition to this, other studies on the typology of non-residential buildings can be done according to the same theory and methodology. All these relate to the general question of the creation of building types.
This I have come to see, in relation to a design methodology, that may be based on geometric manipulation but connected to the idea of the implicit structure that originates from, for instance, one of the cultural themes.

4.2 Transformations

In the third chapter the transformation patterns of the ideal forms were demonstrated with numbers of cases of compound houses. In further, the typological systems can be understood and established in the explorations into various local and thematic transformations. These local transformations are derived from different local themes and can be discussed in terms of notions of the interference, the movement, the context and the shift. This is an advanced independent research based on the typological systems, although I here-with can only explain the major points in a theoretical aspect.

Context

The two primary sources for understanding the transformations are human cultures
and physical systems of environment. The former contributes specific socio-economic and political environments to human activities and the later provides living surroundings for human behaviors. These two particular kinds of environment in combination make the specific context where the local theme is determined.

Interference and Movement

Due to the interferences of time and space, there are vertical and horizontal movements in culture and in physical environment. Only through the phenomena arising during these movements can we observe the physical systems and realize the cultural and local themes.

Shift

On the other hand, these movements result the shifts between different contexts.
text can be historically cultural, economic, social, political, ethnic, or physically environmental, from where the local transformation begins by following specific transformation rules.

4.3 Settlement Typology

There is a much advanced study of typology in the continuity of built environment. This is the settlement typology, in which the types of villages, towns and cities are studied. Due to the continuity of formal structure, this study must be based on the geometric fundamental of house typology done primarily in this thesis. The reason comes from the fact that the elements for structuring the physical forms of settlement tissues, that are at higher environmental levels, are constituted majorly by the formal elements of houses and compounds that are at the lower environmental levels of form.

For instance, a tissue is one of the elementary units of form for constructing a village, a town, or a city. At the other end, it is constructed primarily by units of compound houses at lower levels of form.
As the geometric models were presented in this research, tissue-elements are individually created in different geometric ways of combining compound houses. The compounds are, at a lower level, various combinations of house-elements, pavilion-elements, wall-elements and gate-elements. The tissues at a higher level, together with other elements such as alleys, streets, squares, temples, ponds, and precincts, construct the settlements of villages, towns and cities. Here, a tissue is, in terms of level of form, the medium complex right between a compound and a settlement. This is one of the reasons for that this thesis stops before the level of tissues, from where the next further research on settlement typology can begin.

Finally, in terms of both the general theory and the Chinese context, the continuity of built environment can be interpreted as the following.
The similar theory and method can be applied to the studies of non-residential typology, for example, a typology of temples or of other institution buildings. To certain extent, the sameness between different groups of physical elements can be discovered within the studies, which will relates the typological research to the general question of the creation of building types.

For instance, in the Chinese context the different groups of elements of compounds, of temples and of other institutions are very similar with each other. The crucial point in distinguishing and associating these building types is the differences of rules between them. These differences are not only derived from the particular thematic values that make the geometric origins, but also resulted in the subsequent interventions of local values that cause the transformations on different levels of social contexts.

As regards the house typology presented in this thesis, the thematic value of Chinese compound houses is the cultural theme of the position order underlying the family structure. The geometric origin then is the concentric squares. The geometric transformation rules of this concentric form were demonstrated in this thesis with the explorations into the models and the transformation patterns where we saw types and were implied for systems.

However, different thematic values, different groups of rules but similar
elements of non-residential buildings will in consequence determine their own typological systems and create their particular building types. This understanding facilitates a systematic approach to design methodology, in which new building types are created by going through the subsequent decisions of elements, of thematic values and of geometric transformation rules.
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Fig. 24(11) Fig. 24(12)

From (19)
Fig. 58, except for (11), (22), (28), (37), (38), (39), and (40)

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Fig. 48, (Fig. 33)

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