

書院造とパリのアパートマンの空間構成手法に関する比較研究  
-スペースシンタックス理論を用いた分析-

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# Doctoral Dissertation Examination Report

## Examination Committee

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| (Chair Examiner)  | Masami Kobayashi<br>Professor, School of Science and<br>Technology |
| (Deputy Examiner) | Hiroyuki Sasaki<br>Professor, School of Science and<br>Technology  |
| (Deputy Examiner) | Tomoaki Tanaka<br>Professor, School of Science and<br>Technology   |

**I Candidate**      Eri Sakai

## **II Dissertation Title**

A Comparative Study on the Spatial Composition of Japanese *Shoin-zukuri*  
and the Paris *Appartement*

—through the analysis method of Space Syntax Theory—

(Japanese)

書院造とパリのアパートマンの空間構成手法に関する比較研究

—スペースシンタックス理論を用いた分析—

## **III Structure**

This thesis consists of the following 6 chapters.

Chapter 1: Introduction

Chapter 2: Research Methodology

Chapter 3: Analysis of Paris *Appartement*

Chapter 4: Analysis of the *Shoin-zukuri*

Chapter 5: Discussion

Chapter 6: Conclusion

## **IV Summary**

The interior spaces of the different dwelling forms, the Parisian *Appartement* and the Japanese *Shoin-zukuri*, share a common spatial configuration of "room passing through". In modern general dwelling, each room is basically accessed via a corridor, so there are few opportunities to experience this type of space in daily life. It is interesting to note that in the plan configuration of the *Appartement*, the axuality that arises when passing through each room and the circulation line coexist, while in the *Shoin-zukuri*, the circulation line and the "inwardness (*Oku*)" that is unique to our country coexist. In this dissertation, we will discuss the changes in the plans of these two types of dwellings with different historical backgrounds and social environments from the perspective of architectural morphology, which focuses on the existence of autonomous structures in the changes in plan configurations through a different perspective from that of historical architectural study. The background of this research is that the actual state of renovation of historical *Appartement* that are still lived in today is not widely introduced, and that there is not enough academic basis for considering the reevaluation of the *Shoin-zukuri* as a living space. The positioning and process of the study are as follows.

### **Hypothesis Formulation**

The following hypotheses were set up for the houses with passage spaces, represented by *Appartements* and *Shoin-zukuri*.

- (1) The presence of a sense of inwardness (*Oku*) in the reception space.
- (2) Transformation of the flow line and circulation in the house according to the period.
- (3) Separation of public and private spaces by visible areas.

### **Purpose of the Research**

The purpose of this research is to verify the validity of the hypothesis by analyzing the plan of a dwelling with a passage space using the Space Syntax Theory.

### **Analysis Method**

To verify these hypotheses, we use the Space Syntax Theory, which was developed at Bartlett University of London and is a well-established method for analyzing flow lines, to visualize the flow lines and visible areas in a dwelling, referring to the way rooms are used in previous researches. Specifically, a comparative analysis was conducted by visualizing the daily flow lines within the residence and the visible area from the "entrance" to the "high class salon in the back" or "high hierarchical room with *Tokonoma*" in parallel. Furthermore, the background of the common spatial characteristics of the two completely different spaces, the *Appartement* and the *Shoin-zukuri*, and the unique characteristics of each space were discussed.

### **Object of Analysis**

In France, the aristocratic dwelling style that developed in the 17th and 18th centuries was transformed into the *Appartement*, the residential style of the bourgeoisie, in the late 19th century after the French Revolution and after the great remodeling of Paris by Haussmann. The structure of the room from the entrance to the salon in the back, as seen in

the châteaux of the aristocracy, was inherited by later *Appartements*, and has become one of the distinctive features of the space. In modern times, this traditional dwelling plan has been further subdivided and used as a dwelling for ordinary Parisians. Since there are abundant data on the plan in the archives of Paris, the Parisian *Appartement* was chosen as one of the objects of analysis.

On the other hand, the *Shoin-zukuri* is a medieval Japanese dwelling style, which underwent a major change in the 14th century with the transition from an aristocratic to a samurai-centered society. In the *Shoin-zukuri*, the reception space became independent from the living space, and a characteristic change in space emerged with the approach to the *Jodan* (or *Ichi no ma*), and as the period progressed, a variety of dwelling plan patterns became apparent. In many existing examples, the original location and function have changed through relocation, remodeling, and reconstruction, but the basic spatial composition has not been lost today. In the past, Japanese residences also followed the *Shoin-zukuri* style, but today it is no longer the mainstream. Since there are many surviving examples, the Japanese *Shoin-zukuri* was chosen as the second object of analysis.

The interior spaces of the Parisian *Appartement* and the Japanese *Shoin-zukuri* were analyzed using precise floor plan data obtained from a case study of 16 *Appartements* conducted while living in Paris and 104 examples of *Shoin-zukuri* in Japan. Through a precise comparative analysis of both dwelling forms, we were able to discover rules of spatial deformation that could be said to be rather universal, unaffected by social conditions or historical background.

### Verification of Hypotheses

Based on the Space Syntax theory, we verified our hypotheses and obtained the following findings.

- (1) The presence of a sense of inwardness (*Oku*) in the reception space.  
→In the case of the *Appartement*, the inwardness (*Oku*) of the space is a circulation feature, while in the case of the *Shoin-zukuri* building, the inwardness (*Oku*) of the space has an end point with an *Tokonoma* (alcove) or a *Chōdai gamae* (decorative doorway) in front of it.
- (2) Transformation of the flow line and circulation in the dwelling according to the period  
→In the case of the *Appartement*, the circulation was observed in the reception space, while in the case of the *Shoin-zukuri*, the circulation was observed in the living space.
- (3) Separation of public and private spaces by visible areas  
→In the case of the *Appartement*, the visibility of the reception space is high and the visibility of the living space is low. In the case of *Shoin-zukuri*, the visibility of living space tends to be high, and the visibility of reception space is low. (This was especially true for samurai *Shoin*, and this tendency was also observed in *Minka*.)

As a result of these comparative analyses, we were able to provide a theoretical basis for some of the conditions that a sustainable and adaptable architectural space should have in

order to be livable even in the modern age. It is also hoped that the findings will serve as a theoretical basis for future renovations and conversions.

### **Composition of research**

This study consists of six chapters.

In Chapter 1, the historical background of the development of the *Appartement* and *Shoin-zukuri* is introduced and the apparent similarities between the two are discussed. The purpose of this chapter is to identify the precise points of focus for both types of spaces, and to back up the historical background for the factors that led to the differences and transformations of each phase's form, which will be discussed in later chapters. It describes the characteristics of the *Appartement* and *Shoin-zukuri* spaces, and details literature reviews.

In Chapter 2, the floor plan of the *Appartement* and *Shoin-zukuri* will be databased and identify the function of each room from the literature. The use of tools for visualizing “flow lines” and “visible areas” using Space Syntax and the reading of the analysis results are also introduced. In addition, the method of Agent Analysis as a method of plan analysis of *Shoin-zukuri* is detailed.

In Chapter 3, we analyzed the plan of representative *Appartement* from each period of the 18<sup>th</sup>-19<sup>th</sup> centuries using Space Syntax to visualize the “flow lines” and “visible areas”. Each *Appartement* is divided into three phases in chronological order of construction: the first phase "before the French Revolution," the second phase "after the French Revolution ~ before Haussmann's remodeling of Paris," and the third phase "after Haussmann's remodeling of Paris." The usage of each room and its changes during each phase are also investigated to record the development process of the plan.

As an analysis process using Space Syntax, the following processes were conducted: 1) conversion to plan data and understanding of spatial functions, 2) visualization of “flow lines” using agent tools, and 3) visualization of “visible areas” using visibility graph analysis (VGA), and the results of the agent analysis and the VGA analysis were superimposed. The case study analysis is conducted by overlaying the results of the VGA analysis with the results of the agent analysis. In the *Appartement*, the service flow lines were arranged in parallel with the main movement lines, and the *Antichambre* (anteroom), played the role of connecting each room, making it clear that a semi-lattice structure was constructed throughout. This is one of the reasons why this plan structural form continues to be used to this day.

In Chapter 4, we conducted a plan analysis of the interior space using Space Syntax to visualize the “flow lines” and “visible areas”, mainly for *Shoin-zukuri* from the Muromachi to Edo periods. Each *Shoin-zukuri* is divided into three phases in chronological order of construction: Early Period 1, Momoyama/Kan'ei Period 2, and Post-Meireki Period 3. Next, as an analysis process using Space Syntax, 1) conversion to plan data and understanding of spatial functions, 2) visualization of “flow lines” using agent tools, and 3) visualization of visible areas using visibility graph analysis (VGA) were conducted, and finally, a case study

analysis is conducted by superimposing the results of the agent analysis and the VGA analysis.

In the *Shoin-zukuri*, it became clear that a circular flow line on the semi-lattice can be seen in the daily living area, but that the inwardness of the axis structure is intended toward the more prestigious rooms. It is highly interesting to note the presence of a hybrid plan structural form in a seemingly simple plan configuration.

In Chapter 5, based on the visualization data in Chapters 3 and 4, the patterns of development of the plans of the *Appartement* and *Shoin-zukuri* are discussed as a typology, and the relationship of action from a social and cultural perspective is discussed. The major points of discussion in this chapter are (1) the inwardness (*Oku*) of the reception space and its experiential effects (by means of *Enfilade* or continuation space), (2) the change in shape of flow lines and circulation, (3) the separation of public and private space by visible areas, and (4) the sustainability and adaptability of the space. By comparing these four points, the spatial conditions of sustainability and the principle of plan transformation in the period classification were clarified.

In Chapter 6, based on the discussion in Chapter 5, the characteristics of the *Appartement* and *Shoin-zukuri* spaces were further investigated. First, the basic conditions for the spatial form to have sustainability and adaptability and the separation of public and private space are clarified with a diagram showing the location of the inwardness and circulation. Second, the relationship between the circulation lines and the *Antichambre*, and the characteristics of the *Antichambre* in the *Appartement* were clarified, and the function and the characteristics of *Chōdai gamae* and the arrangement of *Zashiki* in *Shoin-zukuri* were also clarified.

## V Originality

First, it is significant that this study has investigated, from a different perspective, based on the people's daily lives, layout and connection of room spaces, flows of daily activities, and the hierarchy of space for outsiders, in the completely different contexts of the Parisian *Appartement* and the Japanese *Shoin-zukuri*, which have been discussed mainly in the framework of historical architectural research. In particular, it is significant that the paper utilizes Space Syntax analysis theory, which is rarely applied to indoor space analysis, to visualize the two different parameters, "flow lines" and "visible area," in the dwelling plan, and to raise the theory of space composition to a higher level of abstract discussion. While Graph Theory, which can be cited as a similar method of analysis, only uses diagrams to show spatial connections, this study directly appeals to the eyes of observers by expressing these in color, leading them to a simulated experience of spatial movement, which is a unique analytical method.

Second, this research started from the personal experiences of the author who actually lived in or visited these *Appartements and Shoin-zukuri*, and in order to find out the reasons

why *Appartements* and *Shoin-zukuri* continue to be lived in today, even though they have undergone various transformations, the data collected from a large amount of existing objective materials and comparative analysis are of high academic material value. It is particularly meaningful to compare European socio-cultural assets, which were transformed from aristocratic dwellings to bourgeois dwellings and are still used as dwellings by ordinary citizens today, with Asian socio-cultural assets, which have passed from aristocratic dwellings to warrior and temple forms and are now treated as consumable and vulnerable, suggests the possibility of a cultural debate that relies on the level of awareness of cultural assets among nations and citizens.

## **VI Evaluation**

Based on the hypothesis that an autonomous structure exists in the variation of dwelling forms, this dissertation is a study that objectively conducted a comparative analysis using mathematical analysis methods, focusing on the traditional *Appartement* living space in Paris, France, and the *Shoin-zukuri* living space in Japan that was created in a completely different environment in terms of both social conditions and historical background. Specifically, the academic value of the analytical method is high, as it elaborately applies the Space Syntax Theory, which is highly regarded as a traffic flow line research theory, to visualize the "flow lines" and "visible areas" of the house and overlaps them to clarify the characteristics of the arrangement method of the house. The fact that the author focuses on the reason why the *Appartement* that have been regenerated and have been lived in for more than 100 years and the *Shoin-zukuri* spaces that have been relocated and remodeled and have remained until today still maintain their sustainability, and develops her original argument objectively, is of great meaning in the global trend toward a sustainable society in the long term. It is recognized as highly significant research.

## **VII Recommendation**

The dissertation has been submitted on having received the necessary research guidance from the Graduate School of Science and Technology. It is judged to be worthy of having the degree of Doctor of Engineering conferred on the candidate as a result of the reviews and the final examination by all members of the examination committee in accordance with the procedures of the Degree Regulations of Meiji University.

Chair Examiner (Signature)