RETHINKING DETAILS IN URBAN MORPHOLOGY: STUDY ON ELEMENTS OF VENICE BASED ON MICRO TYPOLOGY

Shuyu Zhang, Master of Architecture and Urban Planning, Tongji University, China

Li Li, Professor of Architecture and Urban Planning, Tongji University, China

ABSTRACT

Venice is a historic city. In the 1950s, many scholars developed typology into a method for investigation and design of urban architecture. Architect Saverio Muratori taught the course named "Studi per una operante storia urbana di Venezia" at IUAV in 1959. He led students to conduct research activities based in Venice and the result is "Typological Map" recorded the diachronic variations of the urban evolution process. After this, the Venetian architect Carlo Scarpa explored the meaning of details, using collage of historical elements in his design and integrating the old and the new in details to protect the tradition and adapt to the times.

This paper changes the perspective of traditional typology, from the whole to the parts, rethinking the significance of details with people's perception in urban morphology. The traditional typology "thinking tradition and history on the scale of urban" is shifted to the micro typology "thinking tradition and history on the scale of details", in the meantime, the method of reading cities and building is analogized to the method of reading details and elements. This paper starts with the study of the typology of the church, square bridge, stairs, street, corridor, in order to form a dictionary of Venetian architectural elements. Based on study of the application of architectural elements in the urban morphology and the historical context, the function and effect of architectural elements in urban design are summarized. Finally, this paper provides new ideas and perspective for the characteristics and adaptive protection of the historic city of Venice.

Keywords: urban morphology, details, perception, Venice, typology

INTRODUCTION

Venice is a good place for typology research. A large number of scholars, urban planners, and architects have conducted a lot of research on Venice. Walking in the city of Venice, people shuttle through water roads, alleys, churches, and squares with the same function but different forms, constantly perceiving the city from details. In this city, the building and its interior and its exterior environment are equally important and architects continue to draw design inspiration from it. For example, Architect Carlo Scarpa lived in Venice since childhood. The external environmental elements, elevation difference, and the relationship between architecture and water have become the prototype and Inspiration of his later creation. His work Fondazione e Museum Querini Stampalia conveys the relationship between bridge, water, indoor and outdoor transition and elevation difference. Le Corbusier's translation of the external space structure of Venice was also conveyed in the scheme project of Venice hospital. In general, the new hospital is part of the expansion of the city's structure, and it has not changed the city. These four small squares are called "medical units", they are all around a central square, and the parts separated from the corners connect the other spaces.

This paper hopes to explore Venice from the level of detail and city perception. Finally, the stimulus factors that cause changes in human behavior are summarized as physical and psychological

elements, and strategies for optimizing the identification system and public node space are proposed.

BACKGROUND

This topic comes from the Roman University architect Saveri Muratori who wrote a book named "Studi per una operante storia urbana di Venezia" and taught the "Architecture Space Type" course at the University of Architecture and Architecture of Venice (IUAV) in 1959. The base carries out research activities, and the research result is a special map called "Typological Map"(see Figure 1): the ground floor plan of all buildings in a city or area. This kind of map is very similar to the map of the ruins drawn by archaeologists. It can clearly show the structure of the city and can study the type of building through the "Analogy" method. Muratori built a series of history in his research At this stage, we can understand the evolution of the morphology of specific areas of the city. He realized the historical evolution of urban buildings and built spaces, and used it as important background information to guide the construction of new urban areas and the regeneration of historical urban areas. In the study of urban form, he put forward the important concept of "operable history", that is, history can be read at the same time, but also "operable", which can be applied to urban design and architectural design practice.

After World War II, the scholars led by Muratori began to establish the so-called urban morphology theory during the investigation of the historical city. The basic work of urban morphology research includes extensive social investigations. Muratori sees "type" as a formal structure that reflects the inherent continuity in cities of different sizes. This method of urban morphology recognizes the buildings in the city by analyzing the relationship between individual elements and the whole.
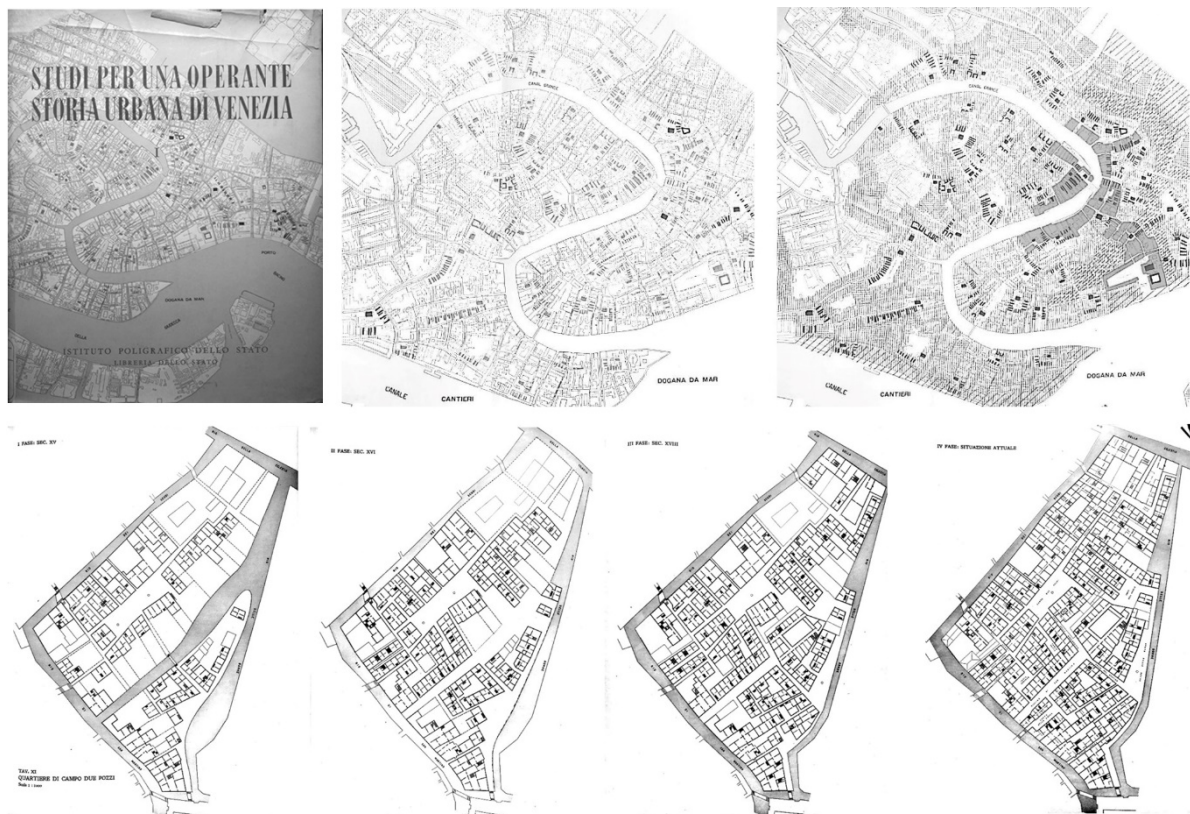

Figure 1. Saveri Muratori "Typological Map" © Studi per una operante storia urbana di Venezia

However, there are also some artists who describe the urban experience of Venice through the study of environmental psychology. Psychogeography is an exploration of the urban environment, emphasizing play and "drifting". Ralph Rumney is a member of Situatonist International, a group of radical avant-garde artists and political theorists established in Paris in the 1950s, Urban drifting is the main tool for situationists to capture the " the sudden changes of ambience " of the city, identify "zones of distinct psychic atmospheres", and ultimately provide information for the generation of psychological geographic maps. Ralph Rumney recorded the details of his journey in his work " The Leaning Tower of Venice. ", "sinister", "depressing", and "beautiful" areas, losing himself in the "labyrinth of alleys, which arouses emotional resonance. (see Figure 2)

Another important example of psychogeography is Sophie Calle's work named "Suite Venitienne". She followed random strangers in Venice while recording the physical environment of the city. Urban drifting can be used as an experimental way to record and plot all this data. Through long-distance walks or detours, to further understand the specific urban trajectory and all its characteristics, making it a place with architectural, artistic, political and social benefits. Urban drifting is a kind of "urban deviation" and a subversive urban walking process, which reconstructs the "spirit of the place" and our experience of the familiar environment. (see Figure 2)

Figure 2. Fragment of Venice Psychogeography Map ©"Leaning Tower of Venice" (Ralph Rumney, 1957) and "Suite Venitienne" (Sophie Calle, 1979)

METHODOLOGY

This paper hopes to turn the research and attention of architectural plan to the external physical environment. In the external environment, from the morphological type of city to the morphological type of elements and details, from urban morphology to human experience perception and narration, the paper focuses on people's feelings in the process of walking in Venice. (see Figure 3)
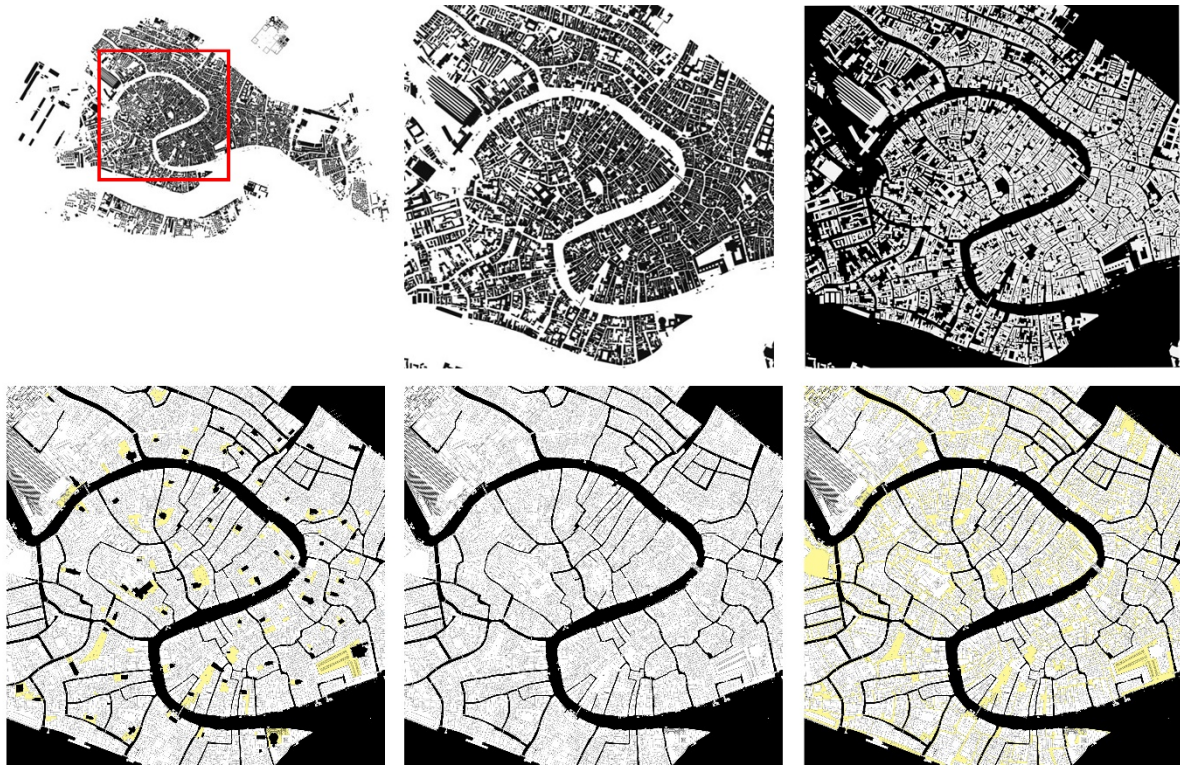
Figure 3. Gestalt Psychology and church/square, water road/bridge, street/corridor in Venice © author

This study hopes to summarize and classify the characteristics and spatial logical structure of the elements of Venice's external environment. Also, this paper attempts to explore the influencing mechanism that affects the distribution of tourist flow, and to find the factors that affect people's path choice and promote the occurrence of lost behavior. Look for the relationship between the geographical and spatial elements of the environment that may affect the choice and distribution of the flow of people and the relationship between the subjective psychological elements of the person and the distribution of the flow of people, in order to establish a mathematical model that can predict the distribution of the flow of people.

FINDINGS

Church/square:

In the external space environment of Venice, squares and churches have become the symbolic urban features in the complex urban texture. Walking in the narrow streets and alleys of Venice, churches and squares as open spaces attract and gather people. Tourists also experience the spatial rhythm change from narrow to wide, and sometimes they feel suddenly enlightened. Through the typological analysis of the church square in the study area, we can get the spatial structure relationship among the church, square and water road.

It can be divided into church square connected with water road and church square not connected with water road. In the case of connecting with water road, the relationship between the church, square and water road can be divided into three types: the square connects water road and surrounds the church, the church is connected to the water road and besides the square, the square connects to the water road and besides the church.
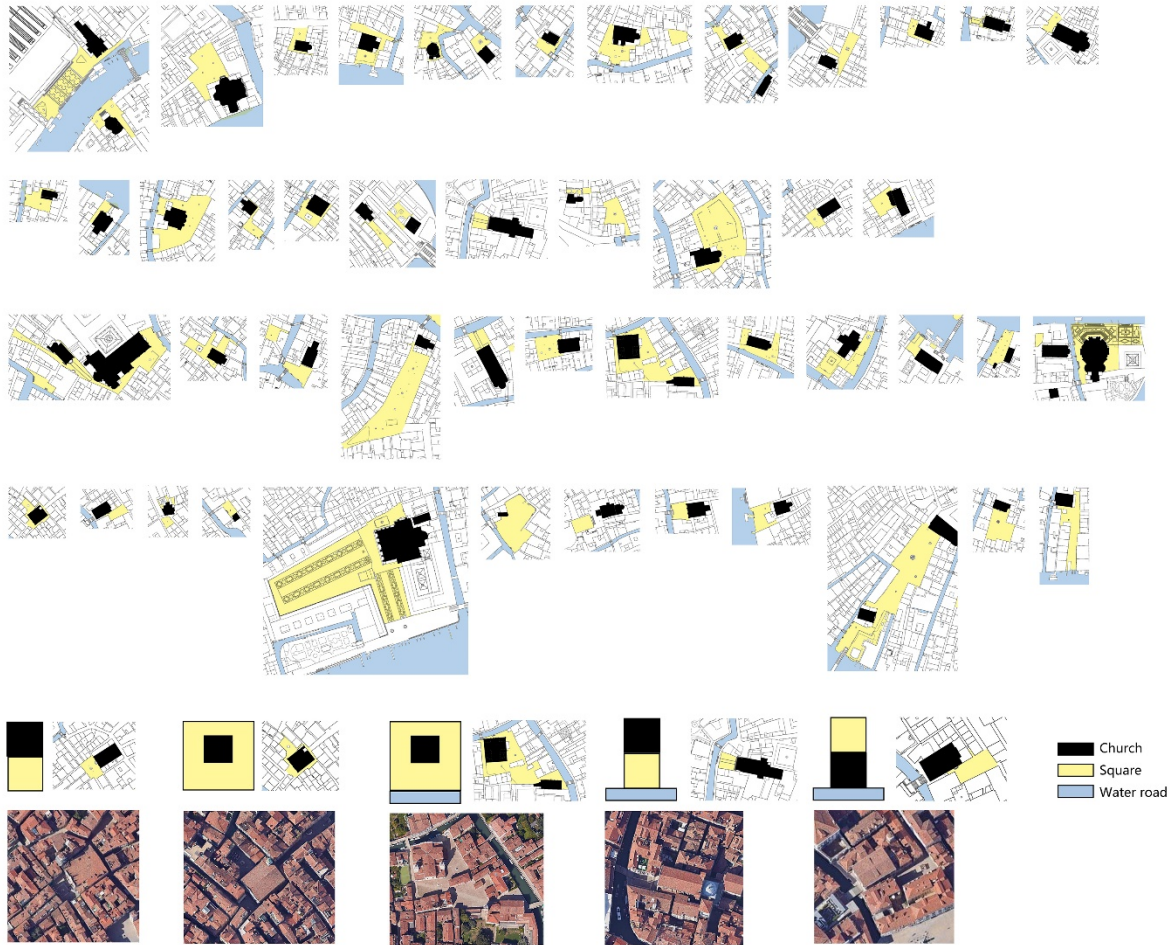
Figure 4. Types of church/square © author

Water road/bridge:

For water roads and bridges, they are also important elements that distinguish them from other cities. The water road and Bridge divide the land area of Venice. The water road divides Venice into many islands. The islands are connected by bridges, and the height difference between islands is solved by bridges. Based on the typological analysis of water roads and bridges in the study area, it can be summarized as the following types.

The water road is flanked by streets. One side of the water road is the street, the other side is the building. There are streets on both sides of the water road. For the bridge, it can be divided into: the bridge connects the streets on both sides, the bridge connects the streets and buildings, the bridge connects the streets and squares, and the bridge connects the squares on both sides. (see Figure 5)
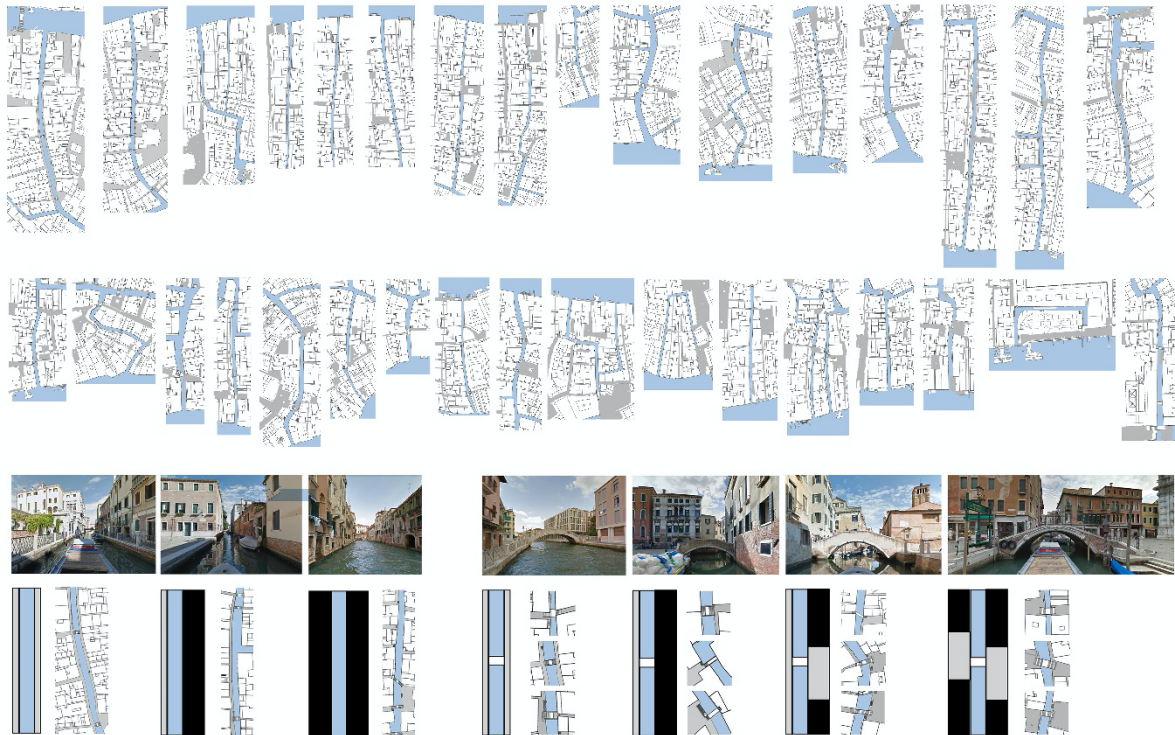
Street/corridor:

As for the street and corridor, try to use Investigation and analysis of the distribution of people flow at road intersections. Through the analysis of the walking isochronous circle, the heat map of pedestrian route distribution and the heat map of pedestrian gathering in Venice, it can be seen that Venice can be basically reached by taking St. Mark's Square as the center and within 30 minutes of walking. Therefore, this experimental investigation hopes to select places and routes with a large number of crowd observation samples. After comprehensive consideration, the tourists start from Venice Santa Lucia train station and the destination is San Marco square to connect the two main islands. The Rialto Bridge on the mainland is a transit point. In the route with a large number of people between these three points, 20 representative road intersections are selected as the research objects.

The distribution of people flow on the main island of Venice is more complicated.selecting 20 representative intersections as the research location and expressing the flow of people in route selection and distribution by the number of people entering the intersection per unit time. The data collection and utilization of people flow was completed on three days during the exchange period of the author at Università IUAV di Venezia. A total of 20 intersections and entrance streets in various directions were sampled three times in different time periods. The recording time is 5 minutes each time, and the average of the three sampling data is used as the path selection and distribution of pedestrian flow at the intersection. At the same time, collect GPS trajectory data uploaded by users on the map data website openstreetmap.org, analyze and select intersections with high trajectory overlap for screening, as the basic reference basis for selecting these 20 people flow observation points.

For this drifting experimental survey, with the help of the semantic segmentation model Deeplab developed based on the convolutional neural network CNN, a total of 70 street view photos in each direction of 20 road intersections were recognized (see Figure 6), so as to obtain data related to the physical space attributes of the street. Among them, the street width, the proportion of road images, the proportion of building images, the proportion of sky images, the proportion of pedestrian images and other factors are used as independent variables that affect pedestrians' choice of route.

Physical factors include the proportion of roads, proportions of buildings, proportions of sky, and proportions of pedestrians within the field of view of street people. This data is automatically generated after recognizing street view images to automatically identify different types of elements and quantify the proportions statistics. At the same time, actual measurement of street width is carried out to master the basic spatial scale of different streets.

Figure 6. 70 street view images at 20 road intersections in Venice and computer vision image recognition © author

CONCLUSIONS

Venice's unique geographical and spatial environment, the water surface, elevation difference, bridges, stairs, etc. are constantly changing. The island has no means of transportation except for boats, which makes the city extremely walkable. This historical city has always been a tourist hotspot, attracting a large number of tourists to come to experience sightseeing. The results of regression analysis of the distribution of tourists show that the key factors influencing are

psychological attraction and functional attraction, the proportion of the sky and the proportion of pedestrians. It can be inferred from this that for Venice, a city that is very suitable for drifting experience, people are more interested and inclined in choosing roads and routes with the large sky ratio, large ratio of street width/building height, wider spaces, such as church squares, water streets, etc. People avoid entering dark and narrow lanes where the sky ratio is very small.

When people accidentally enter narrow alleys, navigation map failures and tourists frequently get lost. However, Venice's road sign system has many problems and the layout is very concealed. For example, many road signs are posted on the wall and are sometimes blocked by various billboards. The signs are not clear. For example, even if you see the road signs, you don't know how to reach your destination. Using AR and other virtual reality technologies to improve the identification system maybe a good solution, the image recognition effect of each street is more intuitive than traditional navigation systems, allowing people who are lost to find the current location more easily. If we want to continue to enhance the atmosphere of the urban drifting experience based on psychogeography and environmental behavior, the functional attractiveness of public space nodes and the attraction of people's psychological feelings will become more important, since people walk in narrow alleys, they cannot see through visual elements. When people go to the attractive sign at the node, they can try to open the sensory experience and guide the direction by holding concerts, seafood markets and other square space activities that stimulate people's hearing and olfactory perception, thereby attracting crowds.

REFERENCES

David Prescott-Steed. (2013) *The psychogeography of urban architecture*, Boca Raton : BrownWalker Press.

Giuliana Bruno. (2018) *Atlas of emotion : journeys in art, architecture, and film*, La Vergne : Verso.

Giulia Foscari Widmann Rezzonico; Rem Koolhaas. (2014) *Elements of Venice*, Lars Muller Publishers.

Sophie Calle and Paul Auster. (2007) *Double Game*, Violette Editions.

Sophia Psarra. (2018) *The Venice Variations,* UCL press.

Xu Leiqing. (2006) *Ergonomics and Environmental Behavior*, China Construction Industry Press.

CORRESPONDING AUTHOR

Li Li, Professor of Architecture and Urban Planning, Tongji University, China, Shanghai, Yangpu District, Rd. Siping No. 1239, 200092. Lixsh57@163.com