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Characteristics of spatial mobility layout

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Abstract. Spatial fluidity is an important form of spatial organization in architectural design, because it can affect the behavior of building users in the building. Therefore, spatial fluidity is also the most basic and core content in space design. Therefore, how to realize the communication and interaction between people and places through the fluidity of space has become an urgent problem to be solved in the construction of modern cities. This paper introduces the concepts of "mobility" and "layout" in architecture through the research method of theoretical analysis, so as to help explain the characteristics existing between them, and discuss the characteristics of spatial mobility layout. Excellent spatial fluidity design is extremely important for some special environments such as enterprises and libraries. It can provide a clear sense of direction and space, reduce unnecessary flow space, and thus improve work efficiency and use requirements.

Keywords: space, mobility, communication, interaction, layout, architectural design.

1. Introduction

From the point of view of modern architectural development, mobility is a trend, and spatial mobility can influence people's behavioural activities in the environment, and maintain a close relationship with people's lives. Spatial mobility is also closely related to layout, which reflects the overall function and structure of the building. According to the spatial fluidity, the spatial flow layout of buildings can be studied and discussed. Therefore, this article will select some representative architectural examples to conduct a case study on the characteristics of spatial fluidity layout. In addition, the article also describes the characteristics of spatial mobility through a literature review and theoretical analysis, as well as references to spatial mobility in meeting human needs, and uses spatial layouts to explore people's perceptions of their environments in order to promote mobility, connectivity, and flexibility.

2. Characteristics of spatial mobility

The concept of spatial fluidity emphasises the characteristics of the concepts of separation without separation, interconnectedness and non-stasis. Fluid space means that spaces are not isolated and completely absolutely limited from each other, but permeate each other, circulate with each other and have a common part with each other [1]. In partition without separation, spatial mobility design divides spaces into segregated areas without the need to go through fixed partitions and barriers. Instead, it separates different functional or activity areas through the use of light, transparent or movable separating elements, while maintaining the connection and interaction between them. Beyond that, spaces are active

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and changeable rather than static, thus emphasising their adaptability and adaptability and allowing them to be adjusted to changing needs and usage patterns. Such a non-static design concept allows the space to respond flexibly to a variety of needs and situations.

3. The mobility of space emphasises the mobility of human behaviour

Human beings are genetically predisposed to produce physical and psychological responses to changes in the environment [2]. In spatial mobility aims to create open, flexible and fluid spatial environments. Architecture has an emotional impact on humans [3]. There are no clear boundaries between the different spaces, but rather they are interconnected by fluid transitional areas or visibility. This design approach promotes free play between human spaces and enhances communication and interaction. These concepts highlight the flexibility, connectivity and dynamism of the spatial layout.

3.1. Case1-Tama Art University Library

Toyo Ito designed the Tama Art University Library, an architectural design that draws on the iconic arches to interconnect the library's internal structure (Figure 1). In order to allow users to communicate in a space free of barriers, it was decided to make the columns at the intersections thinner to release more space, making the interior of the library relatively independent yet continuous and integral, breaking down the internal homogeneity and giving it a state of 'movement' and flow (Figure 2). This design allows people to move freely through the space, facilitating communication and interaction. The permeable and unobstructed architecture of the Sendai Media Centre also allows for the integration of fluidity and function. The Monroe Building building also gives a sense of free flow as it rotates at different angles (Figure 3).

Figure 1. Tama Art University Library -the arches.

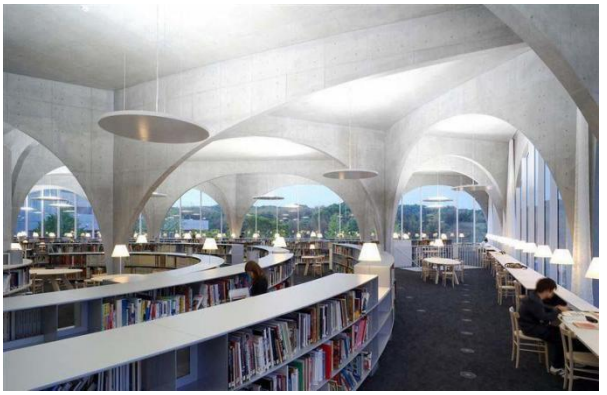

Figure 2. The interior of Tama Art University Library.

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Figure 3. Monroe Building building at different angles.

3.2. Case2-Japanese housing

In the diverse design of Japanese housing, the traditional Japanese architectural space is not timeless, fixed and permanent, but rather dynamic and changeable, with the potential to grow and change as people's needs change [4].An open plan layout is often used, eliminating fixed walls and partitions and creating a sense of open space (Figure 4). This design allows for a fluid connection between different functional areas, adding to the openness and comfort of the space.In the practice literature on the physical design of 'the new office', 'based on very new and very different assumptions about the use of time and space, new ways of working are emerging fast' (1997: 46) [5]. In terms of the design of the new form of organisation, that is to say, different spaces give different impacts, and the placement or transformation of spaces is characterised by flexibility and diversity.On top of the versatility, the same space can be used for different activities or functions, for example the living room can be turned into a bedroom and the dining room into an office area. This increases the efficiency of the use of space and reflects a notion of non-stasis. The fluidity of Japanese housing space emphasises openness, connectivity and flexibility. Through the design of open layouts, sliding doors, moveable partitions and connecting spaces, Japanese housing spaces allow for smooth flow and flexible use, providing a comfortable and free-flowing living experience.

Figure 4. Internal of Japanese housing.

4. Layout design of space

The layout is designed and arranged to promote flow, connectivity and flexibility through space. Real-world scenes are composed of numerous objects, textures and colored regions, which are arranged in a variety of spatial layouts [6]. The different spatial flows also give a different vision of flow. In terms of spatial layout, there are symmetrical, asymmetrical and free-form layouts (Figure 5).

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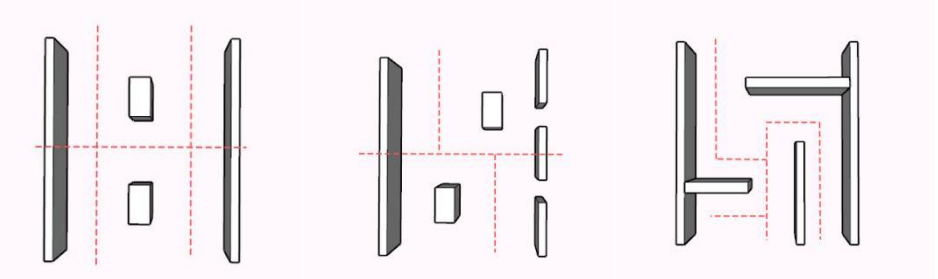

Figure 5. Different spatial flows.

4.1. Symmetry

Symmetry in spatial layout is the use of symmetrical elements, forms or arrangements in a design to create a sense of balance and harmony. Common spatial layout symmetries can also be classified as axis symmetrical, radial symmetrical and reflective symmetrical layouts. Axial symmetry is one of the most common types of symmetry and is based on a central axis that divides the space into symmetrical sections on either side. For example, the Taj Mahal, museum galleries and the interiors of churches all use axial symmetry to reflect the flow of space through each other. Radial symmetry is the creation of a sense of symmetry through the radial arrangement of elements or the formation of a radial symmetrical pattern based on a central point. For example, in a library reading room, the central reading area is the core, surrounded by shelves, desks and seating. Reflective symmetry refers to the division of a space into left and right symmetrical sections through mirror symmetry. For example, the main façade of the Palace of Versailles in France. The use of symmetry can give a sense of order, stability and balance and plays an important role in creating a comfortable and beautiful spatial environment.

4.2. Asymmetrical

However, symmetry is not the only option that applies to all design scenarios, as asymmetrical layouts can also bring a unique aesthetic and creative effect, allowing a sense of freedom while walking around. When one moves about the world with vision, one can literally see the simultaneous transformations of the directions of objects from oneself[7]. Asymmetrical layouts are therefore also extremely important in spatial layouts. Asymmetry in spatial layout can be divided into offset layouts, asymmetrical divisions, irregular shapes and also diagonal angular layouts. In an offset layout, elements are placed in different positions, which can create a dynamic, irregular visual effect and make the space more interesting and striking. For example, the CCTV headquarters building and Sydney Opera House in Beijing use an offset layout design.

In an asymmetrically divided layout, the space is divided into areas of different sizes or shapes, rather than being evenly and symmetrically divided. This layout creates different focal points and centres of gravity in the space, adding a visual hierarchy. Examples include the Louvre and the National Art Museum in Sydney.

The asymmetrically divided layout of these architectural spaces creates a unique look and spatial experience, lending character and artistry to the building. Asymmetrical layouts can bring innovation, dynamism and uniqueness, and can accentuate the individuality and visual appeal of a space, creating a spatial environment that is rich in character and expression.

4.3. Free-form layouts

In addition to this, spatial layouts can be used to organize and arrange space in a free and unrestricted manner. In a freeform layout, a building can be freed from the constraints of a traditional grid to produce a free-flowing spatial form, thus realizing a highly free spatial design. It is a breakthrough to the traditional design concept in design, and at the same time enriches its expressive form in architectural use. It not only encourages interpersonal and social interactions, but also creates open space and a vibrant shared environment.

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5. Impact of the spatial layout of mobility

The flow of interior space has an important influence on architecture. Daily living and working environment is highly determined by the physical, architectural space around us constituted by buildings with walls, floors, ceilings, furniture, etc [8]. A good interior spatial flow not only improves comfort but also provides a smooth and efficient functional layout that meets the building's usage needs. A good spatial flow layout takes into account people's walking paths and the openness of the space, ensuring that people can move freely around the interior. In terms of spatial perception, the spatial flow layout also influences people's perception of the environment in terms of coherent mobility and visually guiding people to move freely through the space. It provides a clear sense of direction and space. In terms of functionality, a rational spatial flow layout can also improve worker efficiency and reduce some unnecessary flow space. This is extremely important for some environments such as people's offices and businesses, and can improve work efficiency. People shape the buildings they use, and then buildings also shape people [9].So the concepts are all connected, we give buildings a rational layout and equally rational buildings give us good value. In terms of aesthetic value, a good layout design can also add to the beauty and attractiveness of the building and create a rich spatial experience.

6. Conclusion

This paper analyzes the flow of interior space in architectural design through theoretical and case study analysis. An excellent flow of interior space can improve the comfort of living residences and also provide more efficient space utilization for libraries, businesses and so on. Therefore a well laid out building will increase its use and ornamental value and enrich the spatial experience of the users.

However, this paper only describes the typical case, without in-depth explanation and exploration of its specific mobility, and will subsequently focus on the specific application design, as well as analyze different dynamic line design, so as to deepen the study of spatial mobility design.

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