

# Research on Interaction Design of Exhibition Hall Indoor Experience Based on Environmental Behavior

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**Abstract:** Environmental behavior emphasizes that human cognition and behavior come from the interactive experience brought by the environment to the human body, which can provide a theoretical reference for the study of interior space design of exhibition halls. This paper explores the experience interaction design method in the interior space of the exhibition hall from the perspective of environmental behavior, and proposes to design the interior space experience interaction from three levels: personal cognition, behavior triggering, and human-environment integration. The case of interactive exhibition items in the pavilion validates this design method.

## 1. Intersection of Environmental Behavior and Exhibition Hall

The exhibition hall is a public indoor space for temporary exhibits. Traditional exhibition halls have strict requirements for exhibition arrangement. Visitors only appreciate the exhibits visually, but cannot interact or even spiritually resonate with the exhibits. However, human cognition and sensory experience are not only carried by vision alone, but based on the body, through the joint action of multiple senses, behavior and environmental space, to generate multi-angle cognition of exhibits and space. With the development of the times, the design of the exhibition hall has also developed from a simple display of exhibits to a multi-experience space. So what kind of design method can help the exhibition hall change from basic visual exhibit appreciation to multiple interactive experience between people, exhibits and space? Perhaps emphasizing cognition, behavior, and environment can provide a novel and feasible path for the design of future exhibition halls.

Environmental behavior, also known as environmental psychology, as a branch of psychology, environmental psychology, mainly studies the interaction between people and the surrounding physical environment at various scales, that is, the mutual influence and interdependence of the material environment system and the human system Relationship. The theory of environmental behavior can be traced back to the journal "Environment and Behavior" published in the United States in the 1970s. Later, in the United Kingdom, Northern Europe, Japan and other places, many journals, books, and even textbooks appeared one after another. empirical and academic discussion. In today's society, interface UI design, human-computer interaction, architectural design, planning design, etc. are also deeply inspired and influenced by environmental behavior and related theories[1-2].

## 2. Framework for interior interaction design of exhibition halls based on environmental behavior

From the perspective of environmental behavior, it provides a new interactive experience method for the experience of the viewers in the exhibition hall, helps the viewers to integrate into the exhibition, and also helps the viewers to get rid of the "shackles" of the original exhibition hall to a certain extent. Now the world has landed many new exhibition halls that integrate the environment and the behavior of the viewers, such as the water landscape installation "surreal" at the Dubai

World Expo(as shown in figure 1), "THE LUME" in Melbourne, etc. Although the design of the environment can give people a sense of interaction, there are still many problems. Relatively speaking, the timeliness for the presentation of this environment is not long. The pavilion only has one or two features as a feature to attract the attention of the viewers, while most of the design is still the traditional first-line sightseeing style. So how to make the audience interact with the exhibits and the environment for as long as possible during the process of participating in the exhibition, and how to personally integrate into the current exhibition theme and environmental space are the issues to be discussed in this article. Environmental behavior can provide a reliable theoretical basis and practical application for the interior design of exhibition halls through the combination of human body sensation, perception, cognition and the relationship between various elements of the environment. From the existing literature research, the theoretical research framework of Environmental Behavior comes from three theories of psychology: Gestalt Psychology, Structuralism, Piaget School[3-4].

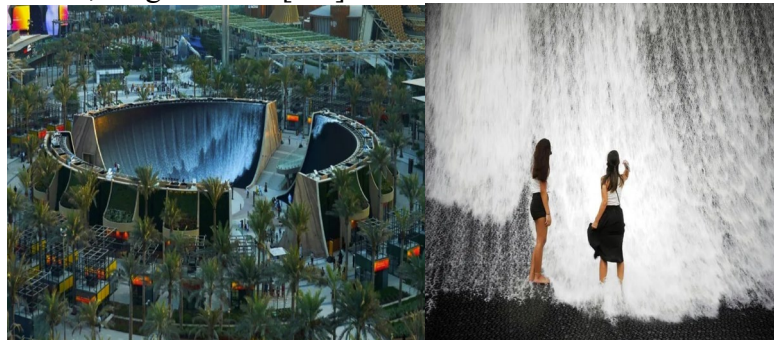


Figure 1 The water landscape installation "surreal".

## 2.1. Personal cognition

An individual's cognition of the outside world begins with the sensation and perception of the body, which also becomes the basis for the connection between people and the environment. The connection between the human body and the external environment is mainly through two aspects: the sensation produced by the external environment and the experience and cognition of the body.

### 2.1.1. Sensory cognition

People produce corresponding cognitive behaviors through sensation, and understand the basic attributes of external things. Sensations are produced by the five sense organs (sight, hearing, smell, taste, touch). According to the viewpoint of "human-machine isomorphism", although there is a world of difference between human beings and machines, both animate and inanimate, from the perspective of human behavior process and machine control actions, both include similar basic components: the five senses The organ is the receptor, which receives and collects relevant information by connecting with the outside world; the central nervous system is the information processor, which stores and processes the information and makes corresponding decision-making decisions; the reaction organ is the effector, which is based on the decision of the information processor Execute the command. For example, a flower in the external environment blooms and emits a fragrance. The nose, one of the five sense organs of a person, smells the fragrance of the flower first, and then the instruction is transmitted to the brain. The brain understands the characteristic of the fragrance of the flower, and then touches it with the hand. Thus completing the afferent and efferent process of the nerve[5].

### 2.1.2. Experience cognition

In addition to using various organs to feel the sensations brought by the outside world, human beings also understand and recognize the surrounding environment based on existing experience, and then adjust and integrate into the surrounding environment. Piaget's "genetic epistemology" explained "schema", where "schema" refers to inherent knowledge or experience, and the formation of "schema" is a process at the cost of time. During this period of time, people's thinking and

cognition will also form a fixed pattern, which will be internalized into different experiences for each person. Studies have shown that when people come into contact with a new environment, they habitually use inherent schemas, that is, inherent experience, to understand the new environment they face. For example, under the mirror cabinet in the public toilet, the paper box is usually hidden, and the hand sanitizer is hung on the wall on the side of the sink. However, in shopping malls with high consumption, it is more customary to hide the paper box and hand sanitizer under the mirror cabinet, and the opening method of the hand sanitizer is set to induction. In this way, on the one hand, inherent experience can help people shorten the time to integrate into the new environment; on the other hand, it will also become an obstacle for people to accept the new environment. When it is the same as the inherent experience, the original cognition is used; when it is different from the inherent experience, it perceives the outside world through different organs and makes corresponding adjustments[6].

In the interactive design of the interior experience of the exhibition hall, the designer needs to make the visitors perceive the possibility of interaction in the environment of the exhibition hall. That is to say, it is not simply display and display, but to let the design in the space environment actively guide the viewers, so that the viewers can consciously integrate into the exhibition environment and interact with the exhibits accordingly. Aiming at the different sensations brought by the above-mentioned human senses, novel design changes are made on the conventional design techniques such as the flow line of people, space transformation, and guide hints, and it can also drive visitors' awareness of the space environment through vision, touch and other senses. Other sensory impressions. For example, bright colors can always attract people's attention. According to different virtual element interfaces, interactive operations are used to implant element instructions, and different implantation results are produced according to their different motion trajectories. For another example, a touchable interface can often arouse people's curiosity, and use it as an attractor to give the initiative of visiting to the exhibits, allowing the exhibits to lead the viewers into the space experience[7].

## **2.2. Behavioral trigger surface**

Behavior is the intermediate interface of the human body under the spatial interaction experience, which connects and integrates human perception, cognitive experience and the environment. The key point is the behavioral trigger of the interactive experience. In the dimensional model of cognition, which Bloom divides into six dimensional processes, cognition begins by triggering recognition and recall in memory as the first dimension. The trigger receives the information, proceeds to the next multi-dimensional human cognitive experience, and then the body produces corresponding behaviors. Behavioral interaction in environmental behavior can be designed from two aspects: ① establish specific functions through the infrastructure of the exhibition hall; ② through pre-set triggers that can trigger behavioral interaction experience.

### **2.2.1. Infrastructure design**

The experience interaction of the exhibition hall space needs to control the duration of each exhibition link to avoid affecting the exhibitor experience. The environmental experience interaction of the exhibition hall space needs to achieve the purpose of actively or passively experiencing the exhibits through the impact on the psychology of the visitors. Human attention is limited, and the brain will be fatigued under prolonged stimulation. Therefore, it is particularly important to form an interactive experience system with clear exhibit information levels and clear primary and secondary traffic flow system. Human cognition includes five levels from low to high: neurocognition, psychological cognition, language cognition, thinking cognition and cultural cognition. For example, the five senses are used as a psychological level to help people recognize the surrounding environment and space from low to high. The space experience interaction of the exhibition hall is a fluid experience process that begins with body perception, just like the hierarchical relationship between high school courses-liberal arts courses-Chinese subjects. Chinese subjects are the most basic interaction level, corresponding to the five senses, that is, in the design

process, It should be considered to start with the interaction steps, the most acceptable behavior as the most basic design level, and then carry out hierarchical communication design upward or downward[8-9].

### 2.2.2. Trigger setting

People often use triggers to bring convenience in daily life, and triggers play a connecting role in the interaction of exhibition hall space experience. Aesthetic psychology points out that the most important feature of aesthetics is its directivity. The human brain will automatically filter out other irrelevant details for the objects and things of interest, and the trigger is to open the gate of the human brain filter. (as shown in figure 2) Today's Internet triggers are divided into manual triggers and system triggers. The cognitive structure is like a shelf, and taking pictures of the shelf and the things on the shelf can be understood as a schema. Based on this, the trigger leads the viewer to "find" the corresponding cognitive structure. Psychologist Piaget proposed that cognitive structure is expressed in the form of schema, assimilation, adaptation and balance. Manual triggers first reach people's perception through controls, gestures, sounds, and touches initiated by users, stimulate cognitive structures, form new schemas, and achieve the purpose of experiencing interaction. Based on this, it is possible to design a variety of interactive experiences that are activated by manual triggers, such as: gesture unlocking of electronic products, using symbols instead of numbers, forming a schema in the mind, and then unlocking[10].

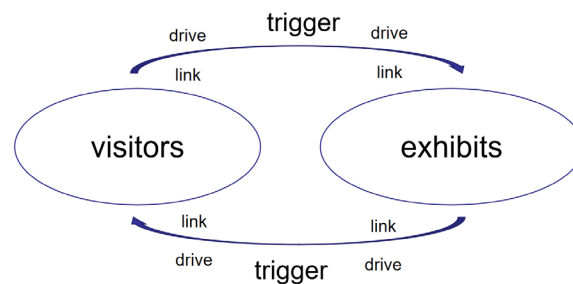


Figure 2 Relationship between visitors and exhibits.

### 2.3. Integration of people and the environment

The fusion of people and the environment is the ultimate meaning of the indoor experience and interactive space of the exhibition hall. Through the interactive experience between the viewers and the exhibits in the environment, and then in the new environment, the viewers physically and mentally integrate into the space environment, so that they can interact and integrate with the exhibits in the environment.

The establishment of environmental behavior is based on cognitive psychology. Modern cognitive psychology believes that human cognitive activities are a unified whole of interconnected and interactive cognitive elements. At the same time, different relationships are also important, including up and down, left and right in the objective physical world, and the relationship between existing knowledge and new knowledge in the mind. When people write, they hold the pen holder with their hands and write words on the paper with the help of the pen holder, and the two are integrated into the spatial context through the relationship of contact. At the same time, the touch of the pen tip across different papers will also bring different feelings to the body. At present, in most interactive settings, interactive operations are limited to visual interactive experiences such as 3D projection and light and shadow technology, and are seldom integrated through the user's touch and body movements. The purpose of interactive experience under environmental behavior is to let users feel integrated Enter the environment, eliminate spatial barriers, and focus on the changes and touches of human cognitive psychology, not simply seeing and browsing.

In the indoor interactive experience, the "field theory" in "field" Refers to the main place where individuals participate in social activities, and is a necessary condition for the development of people's activities and emotions. "Field Theory" provides the viewer with two emotional values, one

is the "familiarity of déjà vu" and the other is the "strangeness that has never been seen before". In environmental behavior, when the human brain judges the two different psychological cognitions of familiarity and unfamiliarity, it interacts with other sensory organs in the environment, and then transforms the two psychological cognitions to generate the viewer's existing cognition. That is to say, in the exhibition hall, the viewer integrates the exhibits with themselves, as if they are one, and the subjective consciousness is displayed with the exhibits in the environmental space. The connotation presented by the exhibits in the environmental space is also perceived by the viewers. Finally, the purpose of displaying the exhibits in the environment is completed.

### 3. Design application case

Nowadays, some exhibition spaces have done research on indoor interactive experience and exhibited corresponding exhibits, but most of them only stay in the visual VR experience. The author explored the application of the above-mentioned interactive design framework in the indoor experience interactive exhibition "Spiritual Realm-Future Inspiration World" at Suzhou Bay Digital Art Museum in 2023, and here is a detailed description of the exhibition space. Through the "Multi-Sensing Planet" and "Future Inspiration City", the exhibition connects the past and the present for the viewers, and personally appreciates the simple beauty brought by the ancient historical period and the cool and surreal sense of future technology. The cosmic experience interactive space brings immersive and participatory experiences to the viewers.

#### 3.1. Personal cognition

During the display of exhibits, through the specific route set up by the exhibition hall and the designated position of the feet on the ground, the viewer is led to a specific interactive area, the trigger is instructed, and the virtual image that performs the same action as the viewer is mapped on the screen. The viewer connects the avatar with his or her own limbs through the display screen in front of him at the same height as the person, and the avatar on the screen can move with the viewer's movements to complete the movement connection between the body and the virtual world (as shown in figure 3). When a trigger-like connection appears on the interface, as shown in Figure xx, a person beats the drum in front of him and uses the pipeline to form different power transmissions, and then presents different images on the screen due to power changes. Through various perception methods, different cognitive methods are presented to the viewers, and then different cognitive concepts are formed.

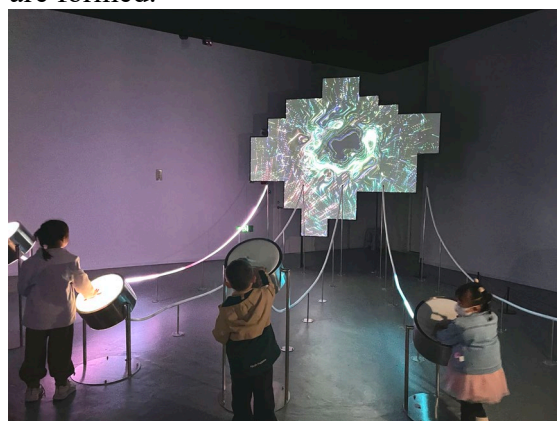


Figure 3 Drum force conduction.

#### 3.2. Behavioral trigger surface

Through the above-mentioned exhibits setting, the audience's cognition of the exhibition space is gradually established. In order to strengthen the interaction between the space exhibits and visitors, touch screens, hand-painted patterns and other links are added. The interactive steps adopt a straight line process and graphic touch buttons to facilitate the clear process of each link, greatly improve the completion of the experience interaction, and form a complete bronze production process and

pattern cognition. On the trigger, simple touch graphics are used to facilitate the operation of the viewer. For example, the owl pattern is based on traditional bronze wares, combined with modern designed planes to form point, line and surface elements, and a trigger of point control-slide-release is designed; in the group photo next to it, modern two-dimensional projection technology and three-dimensional entities Combining the shapes, visitors can face the projection and take photos with their favorite patterns, arouse the interest of the viewers, and form new decorative patterns of utensils.

### **3.3. Integration of people and the environment**

Repeated testing and debugging is a good way to shorten the cognitive "distance" between exhibits and viewers, and at the same time, it can better help viewers integrate into the environment, from physical experience interaction of exhibits to psychological impact. Through the exhibits in front of the audience, the audience can physically connect with the technology of the exhibits, and realize the decorative connotation of the patterns of ancient vessels in their minds. Finally, they record the expressions of the viewers by taking photos, and use big data to derive the meaning of the expressions of the viewers. Gas device with expressive characters. Judging and observing the expressions of the viewers after a series of exhibitions through the position of the device where the gas is emitted, and then making corresponding adjustments to the exhibits. At the same time, the author found that the viewers are keen on analyzing the data of the device, especially attracting the attention of children. It also creates a sense of "social presence". Open the "door" of the exhibition hall for parents with children, and the audience of the exhibition hall will expand, attracting the flow of visitors.

## **4. Conclusion**

From the perspective of environmental behavior, this paper explores the framework structure of the interactive design of the indoor space experience of the exhibition hall, and proposes that the interactive design of the indoor space experience can be carried out through the aspects of personal cognition, behavior triggering, and the integration of people and the environment. The three interfaces are not two-dimensional The interface is a combination of two-dimensional and three-dimensional interfaces, and the three levels are interrelated and progressive. The evolution of the architectural space complexity structure is based on the post-modern complexity philosophy research, specific to the operational level, evolved and proposed a dynamic, hierarchical structure model, each low-level level can be regarded as a high-level "building block", jointly built the entire spatial system. Through cognition of the viewer's behavior, and then to the integration of people and the environment, driven by the trigger of the exhibits, the designer leads the viewer to experience. At the beginning of the design, the designer can start thinking from the level of the integration of people and the environment, and carry out space simulation and reverse design, that is, what kind of physical state and experience method do you want the future exhibits to present, and then refine it step by step to the specific exhibits. The way of presentation on the website, and then show more possibilities of exhibits.

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