Retraction

Retraction: Research on Virtual Reality Experience Design System Based on Artificial Intelligence Technology and Mental Model (J. Phys.: Conf. Ser. 2037 012114)

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The authors of the article have been given opportunity to present evidence that they were the original and genuine creators of the work, however at the time of publication of this notice, IOP Publishing has not received any response. IOP Publishing has analysed the article and agrees there are enough indicators to cause serious doubts over the legitimacy of the work and agree this article should be retracted. The authors are encouraged to contact IOP Publishing Limited if they have any comments on this retraction.

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Research on Virtual Reality Experience Design System Based on Artificial Intelligence Technology and Mental Model

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Abstract. Mental model is the development of human brain thinking. In daily life, it is expressed as the representation of surrounding objects and people in the environment, and it can also be expressed as a stable representation or image of the human brain for permanent memory. As a collection of internal factors, it helps to understand people's motivations, thought processes, emotions, needs, etc. The mental model combined with the virtual reality system technology meets the user's thinking mode, and the product will have an excellent user experience. This article mainly introduces the analysis and research of the virtual reality experience design system based on mental model. This paper uses the analysis and research of the virtual reality experience design system based on the mental model, uses the virtual reality interactive system to design, and reasonably analyzes the feasibility of the virtual reality interface model. The human-computer interaction in virtual reality and the presentation effect of virtual scenes are the two most important aspects of virtual reality experience. The experimental results of this paper show that the analysis and research of the virtual reality experience design system based on the mental model has increased the sense of virtual reality experience by 16%. The limitations of the analysis of the virtual reality experience design system of the mental model are good for virtual reality applications. The methods and approaches of human-computer interaction are analyzed, discussed and summarized, so as to enrich the academic research results.

Keywords: Mental Model, Virtual Reality, Interactive System, Interface Model

1. Introduction

With the advancement of the theoretical research of virtual reality and the development of related graphics processing hardware devices, the application of virtual reality experience design based on mental models is increasingly integrated into people's lives [1-2]. People have entered the 3D era, and the application range of virtual reality technology is very wide: virtual reality, computer animation, real graphics calculation and reality algorithms, rasterized graphics generation algorithms, three-dimensional models and scene rendering are called [3-4]. Now virtual reality interactive systems have been widely used, and image processing for video processing and recognition has also become a research hotspot [5-6]. The combination of virtual reality technology and intelligent video technology
based on image processing technology has produced new applications such as virtual libraries, head-up displays, and auxiliary displays for airplanes and automobiles.

With the advancement of science and technology and the rapid development of the Internet, Kirk, D believes that design is changing with the user as the center, and at the same time it is receiving more and more attention [7]. The interface design carries the communication between the user and the designer, and the design requirements gradually improve from information display to function and aesthetics, and it needs to reach a certain height. The importance is obvious. Cairney J believes that user experience refers to the psychological feelings a user has when using a specific product or enjoying a specific service [8]. In the process of interaction design, the user experience of information technology is the feeling generated by the interaction between the user and the interface [9-10]. Interactive system design mainly includes art design knowledge, application technology and man-machine communication technology. In the early stage, due to the limitation of technology development, the interface design is only provided as the added value of the product [11-12]. Interface design only accounts for a small proportion of the entire design process. However, there are errors in their experimental process, resulting in insufficient accuracy.

The innovation of this paper is to put forward the analysis and research of virtual reality experience design system based on mental model. Research the virtual reality experience design system of mental model and analyze the effective countermeasures of the virtual reality experience system. This part puts forward corresponding countermeasures against the problems of virtual reality system, innovates training models, and strengthens the construction of virtual reality equipment. The aim is to find a new path suitable for the development of the virtual reality experience design system in the current mental model through this research.

2. Virtual Reality of Mental Models

2.1. Virtual Reality Environment Analysis

Under the background of continuous innovation of virtual reality technology and continuous development of computer hardware level, new applications combining mental models and virtual reality technology are constantly emerging. With the help of more efficient graphics processing algorithms and powerful graphics processing chips, virtual display technology has been greatly developed, and the display effect of its virtual scenes has reached a level that can be completely comparable to real scenes. With the continuous development of virtual reality technology, it has gradually been applied to more and more fields: movie special effects animation, video electronic games and commodity three-dimensional display. Through the use of virtual reality technology, the appearance size and material texture of the product can be displayed more realistically and three-dimensionally, and even the user can have an immersive experience, so it is gradually favored by the majority of businesses.

Virtual reality scenes provide conditions for more clear and realistic presentation, and higher performance requirements are put forward for the performance of graphics processing equipment and graphics processing technology that render virtual reality scenes. How to convert geometric concepts such as points, lines and surfaces into the rasterized graphics that human eyes can recognize in the computer is the main research content of computer graphics. In order to make the scene more realistic, it is necessary to combine lighting, texture, material and surface subdivision, etc. Many factors, but also take into account the complexity of computing and the processing performance of the computer, and in order to solve these problems, the line generation algorithm, special matrix transformation, multiple mapping technology, ray tracing algorithm, graphics rasterization algorithm, image processing technology and screen Algorithms and techniques such as tailoring algorithms have also emerged. Taking virtual reality technical indicators as the independent variable X·PAD emotional value as the dependent variable v, there are q dependent variables and p independent variables, the unit eigenvector of the largest eigenvalue, and three linear regression equations of E, F, T, It has the following form.
2.2. Mental Model Application

The mental model has the following characteristics and advantages, simplicity: because the user mental model has the characteristics of simplicity, then the design model presented by the designer should make the system function external and simple, so only the necessary functions are retained, the most commonly used functions should be in the most conspicuous position, while other auxiliary functions should be in a relatively weak position to prevent interference with the user's attention. A successful design model can dilute the background, highlight the main goals and enable users to work efficiently. Familiarity: The design of the system interface should be based on the user's original knowledge system and experience system. The user has experience in interacting with the real society in the real society. Following this experienced interface design model enables users to quickly become familiar Interface and perform interface operations. Availability: A good interface model can provide users with visual clues, reminders, options, and other help when they need them subjectively and unconsciously. Generally, human cognitive ability is much better than memory ability. The system should provide corresponding information in a timely manner, without the need to obtain information through user memories, such as previous setting information, file name information and other detailed information.

Flexibility: The interface design model should be able to support alternative interactions. Allows users to choose the interactive method that best suits their situation. The flexible interface also considers different user-oriented experience systems and different use environments. Feedbackability: The system should provide complete and continuous feedback on behavior results in a timely manner. Any feedback received by the user can strengthen the correct user mental model he uses, or correct the wrong mental model used by him to make his mental model more consistent. The design model expected by the designer to complete the necessary system in time should have the response expected by the user. Perceptibility: The visual objects in the interface model are predictive, and the user can get hints on how to operate according to some characteristics of the objects in the interface. Folder graphics can suggest information that can be opened and stored; trash can graphics can provide information about discarding things. Perceptibility is to show the clues of how to use objects in the interface model, which can guide users to understand how to use and how to operate. The use of real-world objects and logic in the interface model enables users to learn to operate only by observation.

3. Interactive System of Mental Models

3.1. Interactive System Analysis

Particular emphasis is placed on the unity of interaction system and vision before and after. Inconsistent operation methods can cause users to get lost in the information. Using the well-known unified controls can effectively improve the user's learning and operating efficiency, keep it simple and easy to use. Only keep the core functions of the application, remove unnecessary functions, it is best to do one-click multi-use, and put the important content in the main position, prevent the arrangement of too many messy and complicated content in the small screen state.

Whether the analysis and research of the virtual reality experience design system based on the mental model has a great advantage in usability can be confirmed by the comparison experiment between the user's mental model and the information architecture and the usability test results of the software system. This includes two aspects of experiments. One is to extract the user's mental model, and conduct experiments and analysis of the matching degree with the software's information architecture. The second is to conduct comprehensive experiments on the usability of the software to
obtain usability scores. Finally, the matching degree and the usability score are compared to obtain the correlation between the two. In order to study the influence mechanism of design based on user mental model on the usability of information architecture.

3.2. Mental Models in Interactive Systems
In the computer field, a mental model is defined as a system that is used to understand user psychology and successfully predict user behavior. Rauterberg proposed that the mental model includes the following three systems: the logical system of work, the continuous behavior system of goals and the temporary system of individual behaviors. And the mental model is dynamically based on the sensing system, perceiving problems and problem-solving strategies. It is often unstable and changes dynamically depending on external conditions. When users use the system, they continue to receive various information from the system to the user. There are simple information and complex information; there are directly sensible information and indirect information. Through these various information transmission processes, the system gradually transfers the information content of the surface (sensory level), middle (logical level) and bottom (emotional level) of the system information structure to the user's consciousness. This transfer process is achieved through various transfer media.

The concept and characteristics of virtual reality were discussed in depth, the achievements of the virtual reality system were introduced, and the influencing factors of virtual reality experience were analyzed. Through the discussion of the input and output interfaces of the virtual reality system and the analysis of the virtual reality experience effect, it provides a useful reference for the construction of the virtual reality system and the research of virtual reality technology. Summarized several methods of manipulation and roaming, and discussed measures to improve interaction efficiency from a cognitive perspective. The importance of the user's roaming awareness, spatial awareness and artistic conception map creation in the virtual reality roaming process to the roaming efficiency and virtual reality experience is explained. The specific results are shown in Table 1.

| Mental model       | Shared content         | stability | Remarks               |
|--------------------|------------------------|-----------|-----------------------|
| Equipment or technology | Functional operation of equipment | High      | Most stable           |
| Team task          | Limitations of process equipment | medium    | Relatively stable     |
| Team interaction   | Possible failure        | medium    | Able to maintain consistency |

4. Interface Model Analysis of Mental Model

4.1. Mental Model Analysis
According to the mental model described in the figure above, the behaviors are divided into three levels A level: the cognitive level. At this level, users will select the information they need according to their needs, so they will simply understand and describe the information, which is a short-term repository. Level B: Computing layer. After selecting the required information, the information will be processed and calculated. When users change their own processing and calculation methods, some information will enter the memory layer. Level C: Memory layer. Store the rules and the experience gained after processing, and remember them as unchanging rules. The above three levels of operation, the formation of the mental model, first accept the information stimulus of the surrounding environment, select the information to be processed, and then use personal experience to subjectively process and analyze the information to obtain further information feedback. The specific results are shown in Figure 1.
4.2. Virtual Reality Interface Model Analysis

The greatest charm of virtual reality is not only to show people three-dimensional images, but more importantly, it provides people with the ability to interact in real time with the virtual world created by computers. Therefore, VR interactive technology is the most critical technology in the field of virtual reality research. The interaction with the virtual world is an important part of the VR experience. If the display of the virtual world cannot respond to the user's behavior and actions, it cannot be called virtual reality, and the inefficient interaction will greatly reduce the VR experience. More severely, users will have physical discomfort and psychological resistance. The unique interactive characteristics of VR enhance people's spatial cognition. This space includes not only the virtual space or data space constructed by the computer, but also the real space. The application of virtual reality in scientific visualization and the application of augmented virtual reality are examples of these two aspects respectively. The specific results are shown in Table 2.

Table 2. Mental model features

| Norman | Feature       | Alan Cooper          |
|--------|---------------|----------------------|
| Design model | Incompleteness | Performance model    |
| User model | Has limitations | User mental model |
| System appearance | Instability | Implementation model |

There are many factors that affect mental immersion. First of all, physical immersion has a great influence on mental immersion. The higher the degree of physical immersion, the higher the user's sense of presence in the virtual world and the higher the degree of mental immersion. The user's psychological factors also have an important impact on the immersion of the experience. Just like reading a novel, to achieve spiritual immersion, the first thing is to understand the world it describes. The same goes for the VR experience. Spontaneous mental initiative and other factors eventually attract participants to the virtual world. Research shows that skilled VR users are more likely to identify with the virtual world. The purpose of VR experience is different, the degree of mental immersion required is also different. For a VR system for entertainment purposes, its success depends on its ability to attract players, so mental immersion in the experience plays a key role. However, for applications with the purpose of exploring information, high-level spiritual immersion is unnecessary. The specific results are shown in Figure 2. The demand for high-level spiritual immersion has maintained a relatively stable fluctuation between 2016 and 2020, which is at the edge of 80.
5. Conclusions
Although this article is analyzing and researching the virtual reality experience design system based on mental models, there are still many shortcomings. Starting from the development and application of virtual reality technology, introduce the important role of virtual reality technology in various fields, as well as the domestic frontier technology application methods. The application of virtual reality technology not only requires extensive theoretical knowledge, but also a solid theoretical foundation and competence. The analysis and research of the virtual reality experience design system based on mental model still has a lot of in-depth content worthy of study. There are still many steps in the research of virtual reality experience design analysis because of space and personal ability, which are not covered. In addition, the actual application effects of the related experiments of interface design can only be compared with traditional models from the level of theory and simulation.

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