Human-computer Interaction Research in Computer Game Interface Design

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Abstract. With the development of computer technology, computer games continue to appear on the market. The interface design in computer games is particularly important. In order to satisfy the human-computer interaction function of the game, this article mainly analyzes and researches the human-computer interaction design in the computer game interface.

Keywords: Game Experience, Human-Computer Interaction, Interface Design

1. Introduction

With the continuous penetration of information technology in people's lives, daily entertainment is no longer limited to watching TV, listening to music, sports, etc. A new form of entertainment, "computer games", has gradually entered people's lives and it has quickly become popular. Computer games meet the needs of people in the modern age, and it makes people feel an unprecedented entertainment experience. Interface design is an interactive window in the entire game production. A successful game interface means effective human-computer interaction and a good gaming experience [1].

2. Computer game interface

2.1. Games and game world

Computer games are to provide entertainment challenges to game users. In order to make these challenges have real meaning, the game must formulate winning standards, and through the interface design, these characteristics of the game world are fully displayed in front of users.

The game world is the space for game development. For computer games, a variety of real environments can be virtualized, and even some contradictory spaces against the laws of physics are presented through the game interface. The game itself and all the activities of its users are Limited in this game world.
2.2. Experience and game design

Game experience is an important part of computer games, including the game's storyline, sound effects, music, and the degree of interaction and characteristics of the game, as well as the programming code. The focus here is to play a key role in connecting computer games and users. Interactive graphical interface.

Game design is the content that defines the experience of the game, and determines the game standard, control method, information content, etc. The design of the human-computer interaction interface belongs to the category of game design [2].

2.3. Game interface design

Interface design is the overall planning of the communication methods and processes between two different objects. It is the process of optimizing the human-computer interaction relationship. The interface design has interactive, diverse and close technologies for the purpose of simplifying the operation and improving the efficiency of human-computer communication. Relevance and other characteristics.

The game interface design is produced with the development of the computer game industry. From the SPACEWAR running on mainframe computers in the early 1960s, to today's colorful stand-alone games and online games, it can be seen that the game interface continues to improve with the development of computer technology. The interface is the portal for all interactions in the game, and is the link between the product elements and the game. The bond of the person [3].

3. Game user analysis

The game is to provide a real experience, and the purpose of its interface design is to make the interface disappear in the experience, so that the player only feels the entertainment brought by the game itself rather than the existence of the physical interface.

3.1. Game user needs

(1) Entertainment and communication experience: The root of the existence of games is the sociality it embodies. Different types of games will bring different experiences to game users. Players hope to fully integrate into the game world and gain completeness as the plot develops. Process experience. Of course, you can also add more interactive elements in the process to enhance the playability of the game to a greater extent.

(2) Independence and imagination space: When entering the game and the computer game, an independent virtual space is formed, as if you are in a dream world, and to a certain extent, the player is the master of this world. Mind to carry out defined activities in the game. Different types of games give people different feelings, dynamic and static, and meet the needs of different groups of people.

3.2. Game user expectations
(1) Predictability and consistency: The game world is a replica of the real world. In a virtual environment, with the help of the real life experience of the game user, it is the game player's expectation and the game to tell which operations are feasible and the results. To be realized in the interface design [4].

(2) Immersion and suggestive guidance: The game is a complete plot, in which users are immersed, explore step by step, and hope to create their own success stories. For this reason, the interface design must be divided into categories, clearly organized, and successfully completed as a game player. The guide of the game, the real guide is the user, who integrates the usual life experience with the prompts in the game, arouses the subconscious mind, and brings the imagination into the game.

(3) Failure and repetition: Failure is inevitable in the game, which also causes a repetitive problem. In some games, repetition is another major feature. Each repetition of the game can always have a different result experience, especially sports and competition games, such as Tetris and Need for Speed. Game users repeat the game every time. Everyone can experience different feelings, and they will have different "encounters", which are similar to people's real life.

4. Interactive design of the game interface

The main body of the game is the computer programming language behind the screen, but the functions performed by these codes are displayed on the computer screen, and the effective human-computer interaction with the player is generated to obtain the game experience, but the game interface design is completed. The realization of good human-computer interaction must be based on technical feasibility and organically combine it with the subtle aesthetic factors that attract gamers. The basic tasks of game interface design include; dialogue design, menu design, window design, icon design and color design and many other factors [5].

4.1. Interactive design

(1) Phases of man-machine dialogue: "Dialogue" is the basis of interaction. The user's man-machine dialogue in the game is phased, including: forming goals, forming intentions, specifying actions, performing actions, understanding system status, and explaining the system Seven stages including status and evaluation results. The dialogue between the player and the computer is completed sequentially in these stages.

(2) How to complete the human-machine dialogue at different stages above requires different methods to be considered. There are usually five methods: menu selection, form, command language, natural language, and direct operation, as shown in Table 1. Each method has its own characteristics, and how to coordinate the use in interface design is the key to effective dialogue design [6].

Table 1. Five man-machine dialogue modes
(3) Human-machine dialogue design rules: In dialogue design, in addition to understanding the basic dialogue methods, some rules should also be followed. The specific rules are shown in Figure 1.

| Dialogue   | Advantage                                                                 | Disadvantage                                                                         |
|------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Menu selection | The learning period is short; the number of clicks is small, and the structure is clear, which is conducive to error handling | Poor recognition between menus reduces the operation speed of high-frequency players |
| Form       | Simplify data management, facilitate comparison, and only need a small amount of help | The input is cumbersome, which is not conducive to the continuity of the game          |
| Command language | Flexible and attractive to regular gamers Support the player's initiative | Not easy to promote widely Need a lot of training and memory Poor error handling capabilities |
| natural language | Direct use, five learning burdens                                           | Technical limitations                                                                 |
| Direct operation | Present tasks visually: easy to learn and avoid mistakes                   | Programming difficulty Coordination of the use of multiple devices                    |

Figure 1. Human-machine dialogue design rules

4.2. Menu design

(1) The semantic organization of the menu: The primary task of menu design is to establish a practical, easy-to-understand, and easy-to-remember semantic organization according to the requirements of the game task. For most people, hierarchical decomposition is the most acceptable. According to the classification of semantic organization, the corresponding grouping is carried out according to the order
of frequency of use or meaning to sort the options, so that the game menu function is easy to understand and distinguish.

(2) Choose to design the use of the menu in the game depends on the specific situation. Many times, the menu option requires more than one frame of display screen, but still only allows to select one of the options. The solution is to construct a tree-structured menu, and try to use a first-level tree, so as to avoid allowing users to look for it step by step in complex menu selections.

In some games, it is often necessary to always display some operations on the screen for calling at any time. This type of menu is called a permanent menu, and its design style should be extremely uniform with the game itself [7].

(3) Menu language and layout: Most of the menu options are expressed in words, and the design should be as easy as possible to understand, pay attention to the wording, concise and accurate, and easy to distinguish; if it is an English menu, you need to put the key query of the option first Position to meet the reading habits of most people from left to right.

The overall layout of the menu needs to be unified with the game style and interface design, and the starting position needs to be marked with obvious icons, words or numbers. Although the menu design is restricted by factors such as screen size and display resolution, there are few restrictions in the virtual world of the game, and it is often possible to create an ideal solution if it does not stick to the normal state.

4.3. Window design

(1) Single window design: The entire game itself is a large window, and the window design is the planning and layout of its main components and operations.

①Title. Each window has an independent name and should be marked with specific icons and fonts in the game.

②Window frames and scroll bars. It is a good design content that can be used in the game interface, and can be greatly adjusted under the premise of ensuring the uniform style [8].

③Open, close, move and window position and size. Most of the open windows in the game use button clicks, which is highly efficient. The position and size of the window, the game generally has its own settings, mainly to meet the needs of users "reading" rather than "editing".

(2) Window design and task linkage. Due to the need for game information display, two or more windows often appear. Multi-windows should comply with all the requirements of a single window in the design, while also considering the registration and coordination of multi-windows. The game interface should give users a clear idea and provide limited choices.

①Synchronous rolling. This is the basic linkage mode. The actions of the two windows are related, and the change of one window will cause the content of the other window to change accordingly.
② Direct selection. This method is very common. For example, when the player points the mouse to an object, various parameter information about it will appear quickly.

③ Two-dimensional browsing. It is suitable for the game of map scenes. The overall picture of a certain map or graph is given at a certain screen position, and then the details are given in another larger window. The user can operate on the big map and on the small map. Positioning.

④ Opening and closing of the associated window. In all the parameters of the game, often a single window cannot be displayed completely, which requires the classification of this information and includes it in a main window. The user can click to open the corresponding window for viewing. The windows can be retrieved and activated from each other. At the same time, these windows are also designed in different styles according to different types, which is convenient for comparison and viewing [9].

4.4. Icon design

Icon design can reveal the structure, express the relationship and show the individual artistic characteristics. Compared with other logical and textual expressions, it has obvious advantages and can attract users' dialogue activities. Because people's cognitive styles and personal preferences are different, interface styles also need to be varied. Among them, the role of the icon is very important, it uses the form of graphic symbols to plan and process information, and at the same time impact the player's visual experience in image, image, and color.

(1) Icon design criteria: Icon design should conform to people's cognitive habits and design criteria, such as: expressing objects or actions in a familiar and recognizable way, making the icon stand out from the background; three-dimensional icons are more eye-catching, but improperly applied it is easy to distract users; make sure that a selected icon is clearly visible among other unselected icons, and so on.

(2) Icon design level: Computer games involve many parts of icon design, and due to the requirements of personalized interface, icon design in game interface is relatively free, and can be considered more from the semantic level and practical level. For example, the semantic level can express objects through concrete, abstract, part-whole, and practical level should be universal, easy to recognize, easy to remember, and pleasant.

4.5. Color design

Color not only attracts players in the game interface, but also helps to improve the execution of tasks. There are no specific rules for color design in games, and different people have different preferences and understandings of colors. Appropriate and effective use of colors can improve the experience and interactive efficiency of the game.

① Color coordination. The use of appropriate color matching not only meets the needs of the game style, but also achieves the unity between recognizability and game experience
② Limit the number of colors. The computer display can synthesize hundreds of millions of colors, so there will be no need for so many in game design. Choose reasonably to suit the type of game and user group.

③ The color function is coded. The use of color can speed up recognition characteristics, and use different colors to mark keywords or directories in human-computer dialogue, which is an effective human-computer interaction method.

④ The user controls the color. Game users can choose colors independently to enhance their participation and experience.

⑤ The color coding is consistent before and after. The same color coding rules must be used in the entire system, and the colors displayed in the dialogue must be uniformly specified, which is also a satisfaction of the consistency rules.

⑥ Color change indicates state change. This is more obvious in racing games. When the speedometer reading is higher than the speed limit or too high, it is indicated by a gradient from orange to red, and when the speed is lower than the speed limit or the speed is very slow, it is indicated by yellow to green. Gradient to express [10].

5. Conclusion

Computer technology is developing very rapidly, this makes the developmental prospects of game interface design broader. Improving the human-computer interaction performance of games is an inevitable trend in the development of computer games. I believe that the computer games will become more experiential, it will integrate with society and become an indispensable theme in people's lives.

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