Interactive Film and Television Animation Special Effects Production Techniques in Visual Design

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Abstract. Film and television special effect embodies the new development of the combination of visual technology and art. It has become an effective expression method of contemporary movies and an indispensable technical guarantee for creative realization. This article mainly studies the special effects of interactive film and television animation in visual design. This article attempts to take the perspective of visual design as an entry point, push traditional film and television animation to the forefront of technology, and combine the new characteristics of film and television animation with the changes in science to analyze the influence of traditional film special effects theory on digital technology. The changes in the spatial form that have occurred underneath. In this special effects creation, film and television special effects technology and space performance theory are combined. In theory, the three spatial forms in film and television special effects creation are redefined and expressed according to creative practice. They are spatial expression from scratch, spatial expression combining virtual and real, and interactive expression between space and people or things. Technically, it has achieved a breakthrough in its own capabilities. Experimental data shows that under the three backgrounds of medium saturation + high brightness, low brightness + high saturation, and medium brightness + high saturation, there is no more comfortable foreground color to match with it, showing obvious visual discomfort.

Keywords: Visual Design, Interactive Film and Television, Animation Special Effects, Production Techniques

1. Introduction
In recent years, the development of digital special effects technology at home and abroad has been extremely rapid. Through the application of special effects technology, the visual effects presented by animation art are beautiful and amazing. Video special effects processing technologies emerge in endlessly. This article studies the classic video keying-synthesis technology and cartoonization technology [1]. Animation has developed from the original traditional hand-drawn two-dimensional animation to the powerful three-dimensional animation production. The development of animation is uneven in today's society, and animation special effects have also been affected to a certain extent. The
new animation special effect mode in visual design, and even the future multimedia animation special
effect mode, are the products of the development of computer technology [2].

With the progress of society, many scholars have intensified their research on visual design. Kahn's research suggests that visual stimuli on small screens are usually processed very quickly, leading to perceptions that are usually formed automatically without cognitive intervention. Therefore, savvy retailers should strategically use the design elements of classification and packaging to attract attention and increase processing convenience. Classifications that are easy to process are more popular and are considered to have more perceptual diversity. The complexity must be minimized so that the various classifications can be resolved immediately. Classification organization structure, filtering and other design elements can also help resolve [3]. Chen H Y's research found that with the popularity of online shopping, the visualization of product packaging has become an important factor in conveying product characteristics, and it plays a vital role in influencing consumers' purchasing decisions. In order to build a decision support model to help packaging designers create satisfactory product packaging based on consumers' emotional responses, his research conducted a series of visual experimental evaluations on perfume bottle packaging. A decision support model for perfume bottle visual design based on fuzzy analytic hierarchy process is proposed. In the current research, the feasibility of building a model based on fuzzy analytic hierarchy process is proved, and the generated model can provide perfume packaging designers with the understanding of developing new design alternatives in the conceptual design stage [4].

This article first systematically analyzes the application status of special effects technology at home and abroad, and explains the importance of researching special effects technology. Secondly, through objective analysis to explain the types and meanings of special effects technology, and combine the development of animation technology to analyze the three important periods of special effect technology and the practicality and feasibility of special effect technology in animation production. Finally, the actual application of special effects technology is researched and discussed. The performance and realization method of special effects technology in the animation production process are introduced.

2. Method

2.1. Visual Design Research

Visual design can also be called visual communication design. It is a design that is expressed and conveyed to the viewer through visual media. It is also an important part of modern art design [5, 6]. In the mid-nineteenth century, many countries in Europe and America launched a series of innovations and researches in the expansion and extension of "graphic design", and visual design came into being. Visual design specifically means that the designer analyzes and organizes information according to specific design goals, and then designs and creates visual elements such as text, images, colors, graphics, and three-dimensional modeling into orderly and intuitive visual information, which is conveyed to the viewer. The process by which the viewer has a certain impact on the viewer. With the rapid development of science and technology and new media, visual design has expanded into a variety of different types of artistic design expressions, including advertising design, poster design, packaging design, VI design, corporate brand image design, logo design, and identification system, as well as various movies, computers, animations, websites and even non-printing, virtual spaces, etc. [7, 8].

The main way people obtain information from the outside world is through vision. In daily life, all kinds of visual information such as images, movies, pictorials, and advertisements are flooded. The value of design contained in visual design can actually be understood as a demand for aesthetics, which reflects its own aesthetic connotation to a certain extent. At the same time, it relies on its own artistic attainments and appeal to infect those in the spiritual and cultural field, as well as their emotions and concepts, so as to gradually integrate into people's daily life and play an important role in it.
2.2. Features of Special Effects Technology

Special effects technology is a complex that not only integrates computer animation technology, but also integrates art modeling technology, image technology, sound technology and other processing technologies. Integrating various information such as pictures, text, and sounds to form superior auditory and visual sensory effects [9, 10].

Special effects technology is based on computer digital technology, which converts pictures, text and sound into binary data that can be recognized by the computer, and shares data with many machines. Special effects technology expands the relationship between time and space. Film and television art can express the lost world, the unknown world, and the undetectable outer space with the help of special effects technology. Special effects technology has also been applied to other fields, such as communications, medical and health, aviation and navigation, science and technology. It can also transform and process the input information, enhance the performance of the output information, and enrich the display effect. The multidimensional nature of this information space makes the way of expressing information no longer single, but vivid, vivid and truthful. Special effects technology enables non-linear editing. Special effects technology uses hypertext links to express content in a flexible and changeable way, changing people’s traditional reading and writing patterns, allowing users to follow their own needs, interests, task requirements, preferences and cognition features to combine pictures, text, sound and other information.

3. Experiment

3.1. Experimental Materials and Equipment

The experimental materials used text and visual frame demonstration animation produced by AE, and two experimental tests of text and visual frame effects were carried out. Divide into two groups of experiments. One group is text effects, which are divided into 5 types of text effects summarized above for demonstration; the other group is view frame effect, which is divided into 3 types of view frame effects summarized above for demonstration. Experimental equipment, the computer is configured with a 23.8-inch Dell U2414M monitor with a resolution of 1920 X 1080, a Core I7-4790 processor, and 24GB memory. Participants reacted by clicking on the interface with the mouse.

3.2. Production Process of Digital Animation in Mechanical Courseware

(1) Pre-production

Pre-production means that before making three-dimensional animations, we must first select the computer used, and then carefully analyze the working principle of the engine, and have a detailed analysis of each work process, and then make a reasonable production of the entire animation. The planning and precise design of the camera mainly include 3D model design, material assignment, and lens script design.

(2) Mid-term production

The scenes of mechanical animation do not need to be gorgeous tablecloths and backgrounds, nor do they need to make stunning scenes like the shocking picture effects in film and television and the luxurious team in the blockbuster animation. It only needs to be able to bring out the theme and knowledge expressed by the mechanical animation, but the scene must also have a certain degree of artistry and authenticity.

(3) Post-production

Since the output animations are several separate animations, AE and EDIUS need to be further trimmed in the later stage. AE software needs to add some parts transparency, font description effects, and replace background images. It is also through AE software to add special effects for later film and television.

3.3. Results Statistical Analysis Method

(1) Coordination Coefficient
The coordination coefficient can be used to express, usually called the coefficient of variation, as shown in formula (1).

\[ V_i = \frac{Q_i}{E_i} \]  

\( V_i \) represents the degree of coordination of the expert's evaluation of the i-th index. The smaller the coefficient of variation, the higher the degree of expert coordination. The smaller the value, the greater and more important the expert coordination of the index.

(2) Degree of Dispersion of Expert Opinions

The degree of dispersion in expert evaluation refers to the divergence of the index evaluation results. The degree of dispersion is usually expressed by the standard deviation \( Q_i \), as shown in formula (2). Among them: the larger the value of the standard deviation, the greater the degree of disagreement between the evaluation results of the expert, and the smaller the value of the standard deviation, the smaller the degree of disagreement.

\[ Q_i = \left[ \sum_{j=1}^{5} m_j (E_j - \bar{E}_i)^2 / (d - 1) \right]^{\frac{1}{2}} \]  

4. Result

4.1. Digital Video Quality Evaluation

Digital video quality evaluation is to invite a group of non-expert users to watch a series of test videos continuously in a specific environment, for about 12 to 18 minutes, and then use different method indicators to let the subjects evaluate the video sequence. The quality is scored, and finally the average opinion score is obtained, and the data obtained is analyzed. The purpose is to help the designer improve the plan through testing, achieve further optimization, and test the pros and cons of the design. Common test indicators include: accuracy, clarity, conciseness, clarity, color balance, gorgeousness, uniformity, etc. The evaluation data and evaluation results are shown in Table 1 and Figure 1.

| Program         | Group A | Group B |
|-----------------|---------|---------|
| Accuracy        | 8.52    | 9.45    |
| Clarity         | 9.29    | 8.45    |
| Conciseness     | 9.45    | 8.42    |
| Clarity         | 9.75    | 8.52    |
| Color balance   | 8.36    | 9.15    |
| Gorgeousness    | 8.96    | 9.78    |
| Unity           | 9.25    | 8.21    |

Table 1 shows the evaluation results of 15 testers on the schemes A and B. The evaluation standard is (1-10), and the evaluation level is accurate to one decimal place. Through the experimental evaluation data, the feasibility of the experimental guidance of the visual performance of the product display animation user experience can be basically determined. Due to time constraints, only 15 users were tested. Most of the test materials for user experience experiments are case materials, with relatively high accuracy. According to the average value of the test, the overall video solution is at a relatively high level, taking into account the special environment of the Chinese Academy of Sciences According to the demand, the picture is not easy to be too gorgeous, the overall level of plan A is high, but some details still need to be improved and fine-tuned. The product display animation design needs
to be further refined, optimized and perfected continuously, and its usability and guidance effect should be maximized to be suitable for the design and production of various project plans.

![Figure 1. Evaluation result graph](image)

### 4.2. Simultaneous Changes in Saturation and Brightness of Foreground and Background

#### Table 2. Preliminary experimental data table of simultaneous changes in saturation and brightness

|                                | High brightness | Medium brightness | Low brightness |
|--------------------------------|-----------------|-------------------|---------------|
| High saturation/high brightness| 2.2             | 1.3               | 2.6           |
| High saturation/medium brightness| 2.45           | 1.2               | 3.8           |
| High saturation/low brightness  | 4.69            | 3.41              | 1.35          |
| Medium saturation/high brightness| 2.24           | 2.25              | 1.254         |
| Medium saturation/medium brightness| 3.654          | 1.95              | 1.8           |
| Medium saturation/low brightness | 4.21           | 4.32              | 1.54          |
| Low saturation/high brightness  | 1.25            | 3.524             | 3.89          |
| Low saturation/medium brightness | 3.26           | 1.25              | 1.6           |
The experiment in this paper attempts to explore the visual comfort when the saturation and brightness of the foreground and background change at the same time, taking the green with the worst visual comfort in the previous experiment as an example. Table 2 is the preliminary experimental data table. Figure 2 shows the simultaneous change of saturation and brightness.

![Simultaneous changes in saturation and brightness](image)

**Figure 2.** Simultaneous changes in saturation and brightness

Preliminary conclusions of experiments with simultaneous changes in saturation and lightness under different saturation and lightness backgrounds:

1. Under the hue with low saturation/high brightness as the background, the foreground of several combinations with better visual comfort experience are ranked as follows, low saturation + low brightness, high saturation + low brightness, medium saturation + low brightness, Medium saturation + medium lightness, low saturation + medium lightness.
2. Under the hue with low saturation + medium lightness as the background, the order is low saturation + low lightness, medium saturation + low lightness, high saturation + low lightness, low saturation, and high lightness.
3. With low saturation + low brightness as the background color, the visual comfort experience is better matched with low saturation + high brightness. But it can also be observed that in the three backgrounds of medium saturation + high brightness, low brightness + high saturation, and medium brightness + high saturation, there is no more comfortable foreground color to match it, showing obvious visual discomfort.

5. Conclusion
This paper analyzes the interactive design and realization of animation design from the perspective of art design. Through the analysis of the interactive characteristics of animation, and specifically researches a set of feasible interactive animation from the narrative and aesthetic aspects of interactive animation design. Design theory and methods. Therefore, at this stage, the study of interaction in animation design has practical value for the study of design theory, and has important significance for the extensive practical needs of interactive animation design, and its research results have direct practical application value. Obviously, the one-way information dissemination method of traditional
animation can no longer meet the increasing audiovisual requirements of the audience, and people are eager to participate in the animation. Interactive animation as a new way of communication and design of animation, so that animation not only has the dual functions and enjoyment of visual and auditory sense, but also because of its interactive fun, it has become modern people relax themselves, express themselves, and even intoxicate themselves.

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