

# Research on the application of popular culture symbols in animation schema

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**Abstract:** In recent years, China's animation industry has developed rapidly, but it is also affected by many factors. There are still some problems in animation schema design, such as uneven good and bad, poor integration of cultural symbols and so on. In order to solve the above problems and effectively increase the cultural penetration effect of animation industry, this paper proposes to study the application of popular cultural symbols in animation schema. Based on the semiotics principle, this paper finds out the structural characteristics of popular culture with the characteristics of animation visual symbols as the basis of creation, introduces the concept of popular culture symbols and its application function in animation schema design, so as to effectively create an animation schema image that can not only meet the needs of entertainment, but also convey the connotation of cultural spirit. Combined with the development status and trend of animation industry, the application methods of popular culture symbols in animation schema are optimized and improved, so as to effectively improve the level and characteristics of animation production, and better ensure the cultural output and penetration effect of animation industry.

## 1 Introduction

As a special multi-media culture art, cartoon work schema has the characteristics of cultural transmission by audio-visual function. Cartoon schema design is becoming one of the important media of cultural information transmission. [1] In the process of cartoon design, we should combine the cultural symbols to design synthetically. With the development of cartoon design and production technology in our country, the number of cartoon works is increasing rapidly. However, from a long-term perspective, there is still a certain gap between China's animation design and developed countries such as Europe and Japan. The survey shows that the main reason is that in the process of animation schema design, the use of cultural symbols is relatively small, and it is difficult to effectively integrate cultural symbols and animation content [2]. In order to solve the above problems, it is necessary to optimize the design with semiotics. However, with respect to the theoretical and application research on animation, we shall apply semiotics theory to the design of animation images, learn from the successful experience of foreign countries in the design of excellent animation schemas, and analyze visual symbols, so as to effectively grasp the elements of visual symbols in the process of animation schematic design, and effectively use cultural symbols to better attract audiences to have resonance, and create large-scale animation works with cultural symbols [3]. Based on this, this paper further discusses the reasons for the formation of popular cultural symbols and the connotation of cartoon schema design, and further explores the application of process cultural symbols in cartoon, so as to effectively form the cartoon industry with cultural characteristics and better promote the development of China's

cartoon industry [4].

## 2 Application of Popular Culture Symbol in Cartoon Schema

### 2.1 Design of Pop Culture Symbols in Cartoon Visual Features

From the perspective of visual semiotics, in the process of designing and creating animated cartoon, more emphasis is placed on the aesthetic appreciation of the cultural symbols left behind. Therefore, in the process of creating animated cartoon, attention shall be paid to stressing the freehand brushwork features of popular cultural symbols, using more implicit expressions to display the animated cartoon, and the animated cartoon schema shall run through the plots and emotions of the entire animated cartoon design content. In the process of animated cartoon design, the requirements for the content of draft design are not too strict, and realism may not be paid much attention to. [5] From the perspective of animation schema creation and semiotics, this paper discusses the visual elements of pop cultural symbols in early animation schema creation. [6]. Based on this, we design the character and structure of the graphic symbols in the animation film. Based on this, we need to consider the shape, size and position of the variables in the process. Create the required Animation Schema Feature Model and determine the basic structure of the Animation Schema Feature Category as shown below:

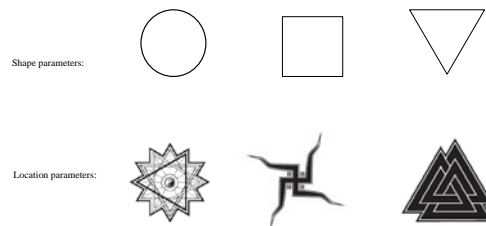


Figure 1. Cartoon schema feature categories

In order to improve the three-dimensional effect of the cartoon image, in the process of making the cartoon image, we should analyze the expression, action, change and other characteristics of the characters, draw the outline of the structure, and design the structure of the instantaneous action of the characters. [7] Combined with popular cultural symbols for visual effects of the screen optimization, so as to bring smooth visual changes in the animation design process. Based on this, the steps to add the medieval cultural symbols to the cartoon are optimized as follows:

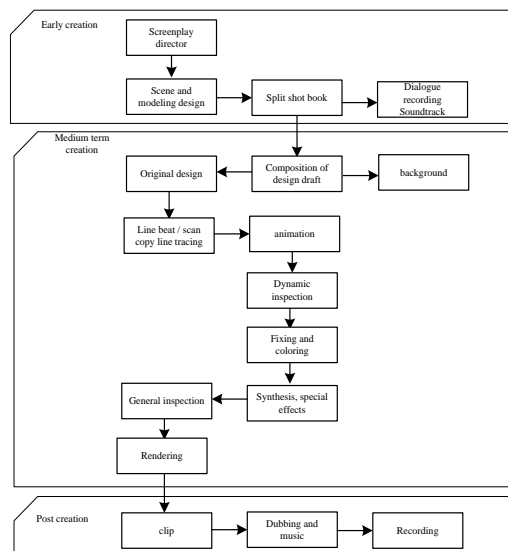


Figure 2. Animation culture symbol schematic design steps

Animation as a new form of media communication, is a very important visual arts and cultural media, has become an important part of modern entertainment media, deeply loved by the audience of all ages [8]. At present, the rapid development of animation design technology has been able to fully meet the design requirements of effective combination of pop culture symbols in the animation design process, so in the process of animation schema design, we need to effectively add the details of animation schema [9]. In order to ensure the effect of cartoon design, it is necessary to combine the early 2D cartoon design features with the present 3D cartoon digitized features, so as to provide more visual expression and pop culture symbol display for cartoon script.

The design sketch of cartoon popular culture symbol mostly uses the mode of hand-drawn lines to display the features, and through the use of color and shape to express cartoon characters and scene features, to realize the effective fusion of cartoon popular culture symbol in cartoon design [10]. In the process of animation design, we need to scan the original manuscript, and use digital media technology to input pop culture symbols, to achieve the design of animation graphics processing. In the process of cartoon schema design, we should pay attention to the overall appearance and creative design of popular culture symbol structure, and provide accurate geometric model parameters for cartoon schema design [11]. Through drawing the two-dimensional cartoon graphics to express the use of popular culture and design ideas, improve the efficiency of design and cultural transmission efficiency. In the process of cartoon schema design, in order to suppress noise interference, the input device is used to input the track and shape of popular cultural features, and a relatively smooth structure sketch of popular cultural symbols is obtained [12]. The contour trajectory  $P$  is fitted by  $N$  times to improve the efficiency of interactive editing of contour trajectories of popular culture symbols. It is defined as:

$$C(u) = U \sum_{i=0}^n N_{i,3}(u) P_i, 0 \leq u \leq 1 \quad (1)$$

The node vectors of popular culture symbol image design are:

$$U = \{0, 0, 0, 0, u_4, u_5, \dots, u_n, 1, 1, 1, 1\} \quad (2)$$

Further use Douglas-Peucker method to extract contour trajectory feature points of popular culture symbols, use interpolation method to generate two-dimensional contour of popular culture symbols, and guide the drawing of animation script of cultural symbols [13]. In order to improve the realistic sense of animation images and scenes, it is necessary to extract the color features of the images and use the symbiosis matrix method to extract the popular culture symbols. Suppose  $I(x, y)$  is the original image of a popular culture symbol animation schema. If the gray scale value is  $n$ , the distance between the two characteristic points  $(x, y)$  and  $(x+1, y+1)$  in the popular culture symbol structure is  $d$ . If  $N_2$  is grayscale combination is recorded as  $(g_1, g_2)$  in the manuscript, and the probability of each grayscale combination is in, a grayscale co-occurrence matrix can be obtained:









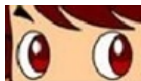
$$P_d(g_1, g_2) = \begin{bmatrix} P_d(0,0) & P_d(0,1) & \dots & P_d(0,N-1) \\ P_d(1,0) & P_d(1,1) & \dots & P_d(1,N-1) \\ \vdots & \vdots & \ddots & \vdots \\ P_d(N-1,0) & P_d(N-1,1) & \dots & P_d(N-1,N-1) \end{bmatrix}$$

In the above,  $P_d(g_1, g_2)$  represents the probability of animation schema gray level. Further optimize the structure of the multi-direction matrix of the animation image, using the gray co-occurrence matrix to generate the corresponding animation schema feature matrix [14]. The corresponding eigenvectors are obtained by scanning the gray co-occurrence matrix in each direction. Furthermore, the mean and variance of feature vectors are used to represent the texture features of the whole cartoon sketch. Based on the original image processing technology, the popular culture symbol object model is established.

## 2.2 Cartoon schema cultural symbol model design

The fusion design of popular cultural symbols in cartoon films has specific cultural characteristics and spiritual connotations. In order to design more interesting cartoon content and characters, we need to add the elements of cartoon schema to express its individuality according to the changing trend of popular culture symbol, and scientifically and reasonably choose popular culture, symbol and cartoon as the basic reference. Because of the variety of expression methods of popular culture symbol in cartoon, some of them even become conventions, it is necessary to further study the rules of using popular culture symbol in cartoon. Taking eyes as an example, this paper probes into the molding rules of cartoon cultural symbols, and the concrete contents are as follows:

Table 1 Modeling Laws of Animation Culture Symbols

Symbol unit	legend	Form of expression	symbolic meaning
eye		Dot formation	Simple and lovely
eye		It is composed of dots and unconnected lines	lively
eye		Dot and surface composition	Simple and lovely
eye		They are all made of circles, with white dots indicating the eyes	Simple and lovely
eye		They are all round	lively
eye		The eye type is exaggerating than the realistic style, and the eyelash features are obvious, similar to the trapezoid shape	Beautiful, young, female
eye		The elements of China's opera are obviously featured by eye liner.	Beautiful, young, female
eye		Round eyes, dots, dull eyes	idiotic
eye		More realistic style, weak double eyelids, oriental characteristics	Gentle, female

Combining with SWOT analysis, i. e. situation analysis, the cartoon schema design is carried out. S represents design advantage, W represents design disadvantage, O represents design opportunity, and T represents design threat. In the process of designing the cartoon cultural symbol model, we should pay attention to the authenticity, objectivity and accuracy of the popular cultural symbol. In order to ensure the design effect of the popular cultural symbol, we need to further analyze the data of the popular cultural symbol, list the advantages, disadvantages, opportunities and threats faced by the cartoon in the production process, and look forward to its future development direction, analyze the use trend and acceptability of the popular cultural symbol. The structure of the SWOT analysis model of the cartoon popular cultural symbol is shown in the following figure.

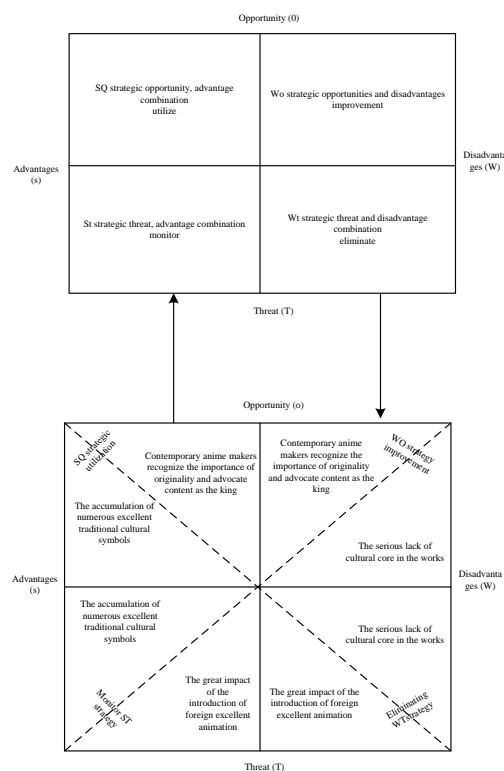


Figure 3. Cartoon popular culture symbol SWOT design model

From the perspective of popular culture symbol theory, this paper sums up the cultural representative symbols in the process of animation design, expounds the popular culture symbols and animation categories, and analyzes the advantages and problems of the use of popular culture symbols in excellent animation works at home and abroad by using the SWOT analysis method, so as to try to integrate the above-mentioned popular culture symbols into the animation works, find the best production mode of Chinese-style animation, and explore the expression mode of popular culture symbols in modern animation [15]. In the process of cartoon design of popular culture symbols, the program is relatively complex. Pop culture symbols need to be integrated into their attributes, including shape, composition, style, color and material. Based on this, through the visual elements and pop culture symbols to convey meaning to the audience, continuous space-time presents animation behavior and state. Based on this, the trend of animation symbol cultural communication is analyzed, specifically as follows:

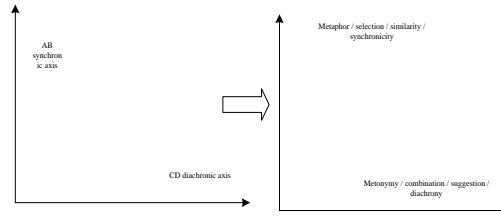


Figure 4. Trend of cartoon symbol culture communication

Usually, in the process of designing the popular culture symbols, we need to combine the synchronic and diachronic features of visual language effectively, and use metonymy, metaphor and coaxial correspondence to optimize the use of popular culture symbols. In the process of designing the popular cultural symbols, we should make full use of the concepts of coaxial, synchronic and continuous axes to analyze the structural relationship between groups and layers.

### 2.3 Realization of the Application of Popular Culture Symbols in Cartoon Schema

In the process of designing and applying the popular culture symbols, we need to classify and construct the popular culture symbols, and analyze and construct the color characteristic symbols of the cartoon images, including the interpretation of image symbols. This paper reviews and classifies the characteristics of cartoon schemata from the perspective of popular culture symbols, and discusses the significance of the application of popular culture symbols in cartoon schemata. Based on this, the types of popular cultural symbols are first divided as follows:

Table 2 Popular Culture Symbol Typology

colour	Image symbol	Symbol	Symbolism
green	Grassland and forest	environment protection fresh	Youth peace
red	Bright red red red carpet	Violence DANGER Jubilation	Revolution Strong
blue	ocean sky	Desolate quiet	Sadness pure
white	White pigeon the white sail Ice and snow	Cold Death (East)	Simple pure
black	Dark night steel coal	Heavy strong terror	Solemn grief
yellow	Moonlight Chicken and duck	Imperial power (China) simple but elegant	Light happy
violet	Wine purple	Luxurious noble	Sinister solemn
grey	Aluminium metal smoke dark clouds	Dreary Insipid calm	Emptiness simple
orange	Orange Persimmon	Anxious warm bright	Annoyance Joy

Based on the data in the above table, the design of pop culture symbols in cartoon can better guarantee the automatic image induction, function simplification and so on, so as to more accurately capture the structure of pop culture symbols. Therefore, in shaping the structure of popular culture symbol cartoon, it is necessary to divide the structure of popular culture symbol into multi-layer planes, based on which the model of multi-layer planes is optimized.

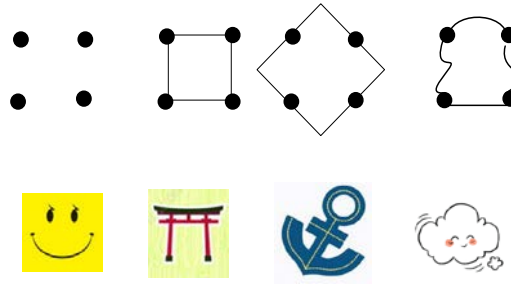


Figure 5. Cultural symbol Animation diagram Multilayer plane split mode

Further, according to the rules of multi-layer plane division of cultural symbol animation ICONS, the complex shapes of cultural symbol animation ICONS are visually simplified. And simplify is not conducive to the transmission of modeling information. In cultural symbol cartoon graphic structure as simple as possible weaken irritating tendency of awareness, strengthening stimulate the use of elements, in order to make up for the simplified information, thereby better to impress the audience, in order to avoid the culture symbol cartoon graphic design process, the image lacks personality, thus losing recognition effect problem, need to sort out in the process of design to facilitate memory characteristic of popular culture symbols and classification and characteristics, in order to find out the prominent part of pop culture symbol. Through the rational application of pop culture symbols and the effective design of animation schema structure, the cultural communication effect of animation design can be better guaranteed, and the content of animation design can be more vivid and interesting.

### 3 Analysis of experimental results

In order to verify the effect of popular cultural symbols in the application of cartoon schemata, the digital media micro- cartoon design system was used to design and study. By calculating the completion rate of pop culture symbols in each cartoon scene, the design effects of different methods are compared, and the display effects of pop culture symbols are compared.

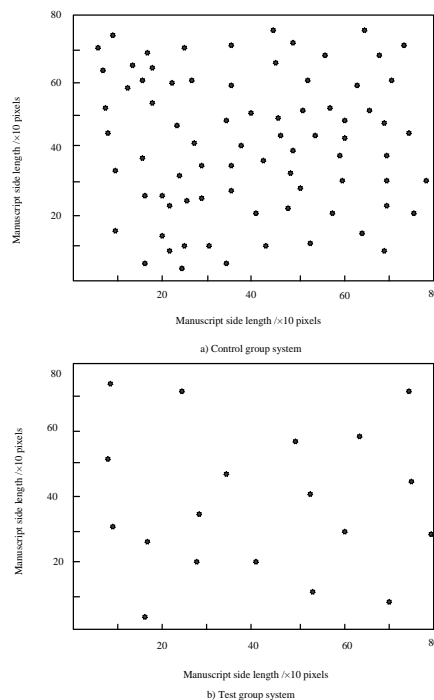


Figure 6. Comparative experimental results

Further investigation and analysis of the application of popular cultural symbols in cartoon

schemas, and statistics of the research results, as shown in the following figure:

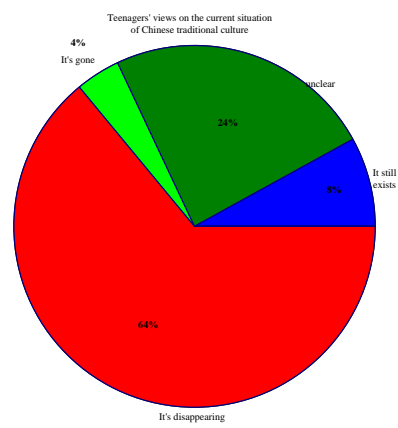


Figure 7. Cultural symbols Diagram of applied satisfaction

Based on the above research results, the popular culture symbols proposed in this paper in the animation schema application effect is significantly better, and audience satisfaction is also significantly improved, further comparative analysis of the popular culture symbols design effect, specifically as follows:

Table 3 Comparison of Pop Culture Symbol Design Effects

Configuration and parameters to configure	control group	Test group
model parameter	Intel i7 950, 4-core 8-thread, 3.06 GHz, 4GB	4-core 2.56 GHz CPU, 8 GB memory, 6 rendering modules
Rendering Parameters	Number of sides: 5.23 million, single frame	Number of sides: 5.23 million, single frame
	Vray2.0,4kb high resolution	Vray2.0,4kb high resolution
time consuming	2 h 35 min 22 s	30 min 10 s

Through the analysis of tabular data, it is found that adding pop culture symbols to the cartoon schema can achieve the goal of cultural communication, simplify the steps of cartoon design, improve the dynamic characteristics and flexibility of cartoon design, and fully meet the research requirements.

4 Conclusion

Based on the current social background, this paper proposes that the popular culture symbols should be used in the process of cartoon schema design, so as to promote the inheritance and innovation of culture and the development of domestic cartoon. Based on the structure characteristics of pop culture symbols, the design of animation schemas can effectively enhance the expression of pop culture in the process of animation design, promote the spread and integration of world culture and promote the development of animation industry.

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