

Image Semantic Method and AHP for Mask Design Research

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Abstract. Objective In the process of transforming cultural and creative products into "culture + creativity", traditional culture and design symbols need to be transformed into a process of popularization. In addition to "inspiration", it is necessary to combine more qualitative and quantitative professional design methods. Cultural and creative design can be followed by rules. Method Taking the Mask design as a practical object, combining the artistic form and inheritance value of traditional Peking opera, starting from the meaning, the form, the demeanor, the deconstruction and reconstruction of the elements by the Image semantic method, and then the AHP (Analytic hierarchy process).Based on quantitative calculation and analytical research, the reconstruction of the scheme is carried out under the premise of grasping the original form characteristics, creating a brand-new design image. Result The conclusions and common senses obtained by the combination of the two methods are not much different. The scheme design achieved by this method is outstanding, with high recognition and innovation. Conclusion Through the practice of cultural creative with Mask design, the verification method has high feasibility, and the practice provides a new way of systematic science for cultural creative design.

Keywords: Derivative design; Image semantic method; AHP; Mask Design.

1. Introduction

The integration of traditional culture and modern products is one of the mainstream ways of current design. On the "shape", "meaning" and "spirit" based on traditional products. For the deconstruction and reconstruction of traditional culture, integrating their own understanding of traditional culture, and combining the two to form a new form of cultural innovation. Based on the Image semantic method and the Analytic Hierarchy Process (AHP), this paper constructs the method model of the creative design, and combines the cultural creative cases with regional characteristics to verify and verify.

2. Fit Value

The problem faced by designers is how to extract the content elements of the original culture and the reorganization of traditional culture and modern products, in line with the inherent needs of cultural, design methods innovation and product re-creation. In the design method, the Image semantic method and the AHP design method are introduced, and the cultural creative design object is regarded as a complex composition system. By decomposing the product into several substructures, the production technical feasibility of each substructure in the object is analyzed. List all possible combinations, perform a secondary analysis of these combinations, and find a viable combination for re-creation. Taking Opera Mask as a practical example, on basis of deep understanding of its morphological characteristics and cultural elements, it collects and summarizes the morphological elements, screens and extracts the sub-elements with unique morphological characteristics, analyzes from the image form, extracts the modeling elements, reconstructs them into the target carrier, effectively realizing the innovation of traditional cultural elements and the reconstruction of contemporary values. From the development of modern products, Peking Opera's Mask culture has a variety of modeling elements. The use of Image semantic method and AHP is brand new attempt in the derivative design of Opera's Mask.

3. Design Process and Method

3.1 Deconstruction

The Image semantic method is used to deconstruct the original culture, mainly focuses on the extraction of elements. The steps: (1) clarifying the problem, collect the required cultural product data, and analyze its characteristics; (2) analyzing the problem according to the basic components such as important functions or important elements, List the independent sub-factors related to it.; (3) The factors contained in each independent factor are listed in detail, and the meaning of the elements is deeply analyzed to explore its inherent cultural connotation. (4) The elements are re-arranged into new creative ideas.

3.2 Reconstruction

After the deconstruction of the original culture, reconstruction is required (see Figure 1). In the elements of dismantling, the corresponding cultural elements are selected, combined with the basic characteristics and functional requirements of the required products, and different cultural elements are extracted for integration design, so that the products are more easily understood by consumers. The reconstructed products should also have inheritance, aesthetics and functionality on the basis of basic requirements.

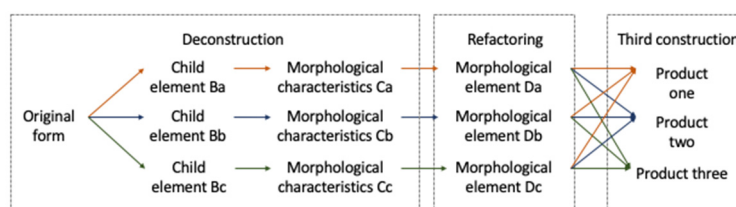


Fig.1 Deconstruction reconstruction diagram

3.3 Third Construction

Establishing a hierarchical structure model based on Image semantic method, layer all analytical problems, and generate a total plan based on different elements and requirements. AHP analysis steps: The first layer is the total demand; the second layer is the child element and morphological feature or the extracted morphological element deconstructed to achieve the overall goal; the third layer is the specific requirement of each specific layer. After analyzing and reconstructing the judgment structure, the consistency check of the judgment matrix, and analyzing and calculating the total order of the hierarchy, the final scheme layer is judged by weight value and relative merit order. (see Figure 2)

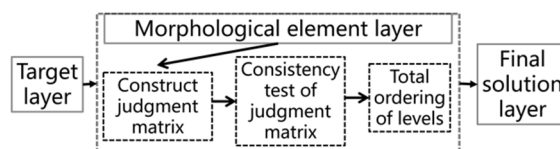


Fig.2 three times constitute a hierarchical structure

4. Cultural Creative Design with Beijing Opera Mask as an Example

Mask design is an inseparable part of the traditional Peking opera culture. forming a unique Beijing opera charm culture. Taking Guan Yu as an example, the combination of Image semantic method and AHP combined with modern design to develop derivatives, enhancing traditional oriental aesthetics, and realizing new creations of traditional culture.

4.1 Mask Design Model Analysis

Collect samples, classify the main structural elements of the mask, and get three main elements of the eyebrow, eye socket and mouth corner. Taking image as an example for typical filtering,

according to its modeling characteristics, three models are selected from three feature morphological elements for further analysis and decision. See figure 3.

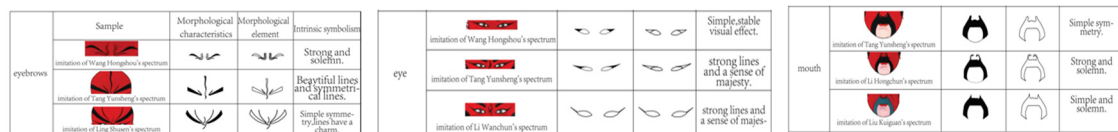


Fig.3 Beijing Opera Mask morphological elements

4.2 Morphological Reconstruction of the Extracted Elements

Using the extracted elements to expand the conceptual design and inject the cultural elements of mask into it. For example, in the design, the appropriate elements can be selected from the eyebrow mouth elements as the design elements of the product. The extracted form should be reasonably changed according to the characteristics of the product. Different elements will produce a variety of different design options, and choose a satisfactory solution will be selected for further refinement. Reconstruction design conveys the profound connotation and significance of the rich traditional culture, so that the public can have a certain cultural identity to the articles in the process of use, and bring the sense of distance between products and people.

4.3 Hierarchical Analysis and Decision Making of Three Sets of Plans

In this paper, 3 sets of suitable eyebrow, eye and mouth element schemes are selected for analysis, which are respectively scheme A(Tang Yunsheng's eye, Wang Hongshou's eyebrow, Tang Yunsheng's mouth), scheme B(Tang Yunsheng's eyebrows, Wang Hongshou's eye, Tang Yunsheng's mouth), scheme C(Shusen's eyebrows, Wang Hongshou's eye, Liu Kuiguan's mouth).

The hierarchical structure of the scheme is established. The first layer is the total demand, the second layer is the criterion layer of the eyebrows, the eyes and the mouth, and the third layer is the scheme layer of each class. See Figure 4.

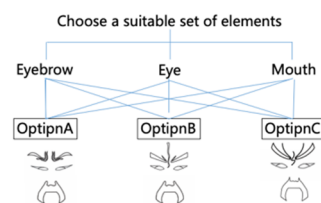


Fig.4 Requirement hierarchy diagram

The judgment matrix is constructed, and the judgment matrix scale is used to compare the demand hierarchy with the assignment value. the comparison matrix and weight value calculation results are shown in Table 1. $CR=0<0.1$, which meets the consistency test requirements. The comparison results show that in the deconstruction reconstruction of the design elements of Mask design, the eyebrows are of equal importance in the design elements.

Table 1. Weight values of each evaluation indicator under total demand

	eyebrows	eye	mouth	Weights
eyebrows	1	1	1	0.333
eye	1	1	1	0.333
mouth	1	1	1	0.333

Then, three standard judgment matrices are established for the three schemes, and the calculation results are shown in Table 2-4. CR is equal to 0.094, 0.000, 0.000, CR is less than 0.1, and the consistency test is qualified.

Table 2. Weight values of the evaluation indicators of each scheme under the eyebrow element

eyebrows	Option A	Option B	Option C	Weights
Option A	1	3	4	0.620
Option B	1/3	1	1/2	0.156
Option C	1/4	2	1	0.224

Table 3. Weight values of the evaluation indicators of each scheme under the eye element

eye	Option A	Option B	Option C	Weights
Option A	1	4	4	0.667
Option B	1/4	1	1	0.167
Option C	1/4	1	1	0.167

Table 4. Weight values of the evaluation indicators of each program under the mouth element

mouth	Option A	Option B	Option C	Weights
Option A	1	1	1/6	0.125
Option B	1	1	1/6	0.125
Option C	6	6	1	0.750

Then, analyze and decide on the above weight data, and the weight values W of the obtained schemes are 0.470, 0.149, and 0.380, respectively. That is, $A > C > B$ in the three schemes, so we choose scheme A for the next analysis decision.

4.4 Analysis and Decision of Mask Design Jewelry

In the analysis and decision of the previous step, we selected the A program for further research and design. In the second stage, we analyzed the criteria by using the analytic hierarchy process for the function, color, shape and material of the jewelry.

(1) The first layer is the total demand of the product, the second layer is the function, color, form and material, and the third layer is the specific requirement of each different criterion. See Figure 5.

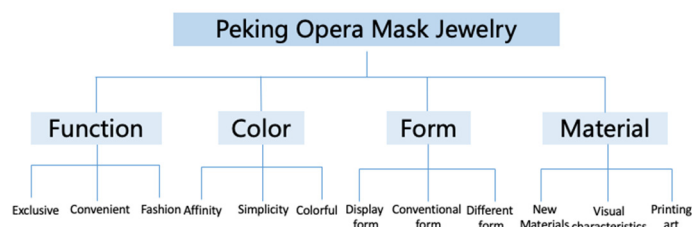


Fig.5 Jewelry demand hierarchy diagram

(2) The judgment matrix is constructed, and the judgment matrix scale is used to compare the demand hierarchy with the assignment value. the second layer is analyzed and compared. The comparison matrix and weight value calculation results are shown in Table 5. $CR=0.034690 < 0.1$, which meets the consistency test requirements. The results show that the demand for jewelry is in the trend of material > form > color > function.

Table 5. Weight values of each evaluation indicator under the demand of jewelry

A	function	color	form	material	Weights
function	1	1/5	1/6	1/6	0.054
color	5	1	1/2	1/2	0.209
form	6	2	1	1/2	0.305
material	6	2	2	1	0.431

Then the third layer of standards built four standard judgment matrices. The calculation results are shown in Table 6-9. CR is equal to 0.09420, 0.06391, 0.01580, 0.07625, CR are less than 0.1, and the consistency test is qualified.

Table 6. Weights of the evaluation indicators of each scheme under the functional elements

B1	Exclusive	Convenience	fashion	Weights
Exclusive	1	2	1/4	0.224
Convenience	1/2	1	1/3	0.156
fashion	4	3	1	0.620

Table 7. Weight values of the evaluation indicators of each scheme under the color element

B2	Affinity	Simple	Bold color	Weights
Affinity	1	3	1/3	0.272
Simple	1/3	1	1/4	0.120
Bold color	3	4	1	0.608

Table 8. Weight values of the evaluation indicators of each scheme under the morphological elements

B3	Display form	Conventional form	Shaped form	Weights
Display form	1	4	2	0.557
Conventional form	1/4	1	1/3	0.123
Shaped form	1/2	3	1	0.320

Table 9. Weight values of the evaluation indicators of each scheme under the material element

B4	New Materials	Visual characteristics	printing art	Weights
New Materials	1	1/3	1/3	0.140
Visual characteristics	3	1	3	0.574
printing art	3	1/3	1	0.286

(3) Calculating the comprehensive weight value of each sub-evaluation index in the whole evaluation system. The calculation results are shown in Figure 6.

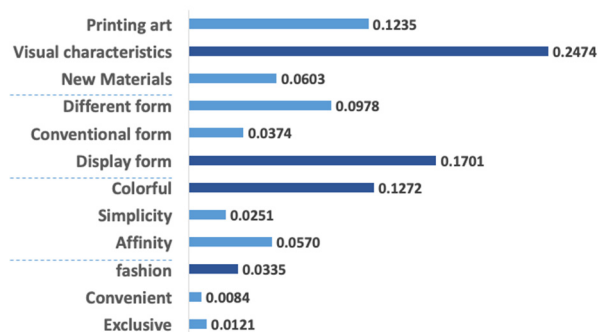


Fig.6 Comprehensive weight value

Through the calculation of the comprehensive weight value, it can be known that the function design is mainly fashion; the color design is mainly based on color boldness, the form is mainly in the form of display; the material is mainly visual; it has the characteristics of suitable price.

4.5 Conceptual Design of the Program

After the above calculations and analysis decisions, the final conceptual design of the program. using Image semantic method and AHP to transform the elements of Peking Opera's Mask into interesting products.

Mask designs can satisfy people's daily applications. this example uses two design methods to extract elements. Spreading traditional culture can increase the fun and aesthetics of the products. Retaining the basic visual features of the product. In terms of color, it reflects the application of element expansion and product fashion tonality.

Using the design software to make the model of the product, it is used to detect the rationality of the combination of the elements and accessories of Opera, and make reasonable adjustments to the details. The color model will be used to verify the feasibility of the model. The fashion function is outstanding, people are easy to accept; the color is boldly used; the product visual characteristics are remarkable. See Figure 7-8.



Fig.7 Opera Mask jewelry concept creative

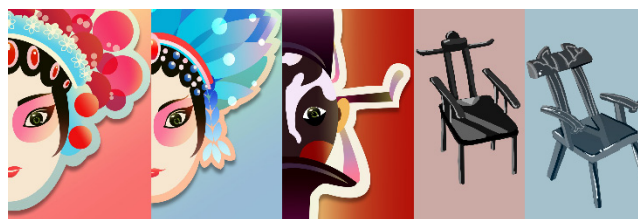


Fig.8 Opera Mask Derivatives Design

5. Conclusion

In this study, the eyebrows, eyes, and mouth are of high importance, followed by materials and forms. Image semantic method and AHP, are applied to the study of literary creation, and the combination of qualitative and quantitative methods is adopted to advance the design. Taking Beijing Opera's Mask as an example, using the Image semantic method, the object elements are deconstructed and reconstructed and the three important elements of the eyebrows eyes and mouth of Opera's Mask are analyzed, and the weight of the scheme is analyzed. The functions, colors, shapes and materials are extended in four aspects. Then, AHP is used to judge the weight of the matrix again based on the determination of the relevant weight value, and the various factors of the element scheme are screened. The qualitative research conclusions are obtained from the previous qualitative research, and the conceptual design of the Mask design is obtained. Finally, the product concept is produced to verify the feasibility and effectiveness of Image semantic method and analytic hierarchy process in the application of traditional culture.

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