

Analysis and Thinking of Visual Elements in Cigarette Label Design Based on Green Concept

Li Ying

Hainan Tropical Ocean University Creative Design College 572022 china

liying10713@163.com

Abstract: “Green design” has become a focal point and has caused widespread concerns around the world. In such a large environment, many designers’ sense of social responsibility is stimulated. When designing, they try to avoid the negative impact of the design on the environment, thereby reducing the environment. The key part of this article on the visual image design is the analysis and research of the visual elements of the cigarette label, combined with some examples of the visual image design of the modern cigarette label in some countries, firstly, it mainly analyzes the themes and cultural connotations involved in the modern cigarette label of the country. The analysis and research with pictures and texts are carried out from six aspects respectively. In the next part, this article discusses the graphic characteristics of cigarette labels from the three aspects of subject matter, expression method, and form of expression, and then discusses the color matching characteristics of cigarette labels from four aspects: three primary colors, composite colors and complementary colors, and black and white. Research and analysis of calligraphy fonts, artistic characters, Latin letters, and decorative fonts are given to explore their functions and roles in the visual image design of cigarette labels. Finally, through the analysis of typographic characteristics and Western progressive culture and design thoughts on cigarette label layout design influence, we discuss the characteristics and style of the cigarette label in the layout design. The results show that the indices of the regression analysis of the three independent variables and the corresponding significance, the significance values of aesthetics and ease of use are all less than 0.05, and the regression coefficients are all statistically significant, and have significant effects on the dependent variables, and the correlation index is positive, indicating that the two independent variables have a significant positive correlation with satisfaction; the useful significance value is greater than 0.05, the regression coefficient is not statistically significant, and has no significant effect on the dependent variable.

Keywords: Green concept; cigarette label design; visual elements; analysis

Tob Regul Sci.™ 2021;7(6): 6639-6650

DOI: doi.org/10.18001/TRS.7.6.136

1 Introduction

Today’s social productivity is constantly improving, and modern design is also constantly leaping along with the development and changes of the times, showing a diversified situation [1]. However, with the development of science and technology, the consumption of resources and energy is accelerating, and the relationship between mankind and nature is continuously deteriorating. Resources are facing exhaustion, pollution is becoming more serious, and pollution incidents that shock the world frequently occur [2]. The harm that industrial civilization brings to the environment makes environmental protection a problem that people pay more and more attention to [3]. Nowadays, people have clearly realized the important role of design in environmental protection, and the ecological research on the construction of a new aesthetic relationship between man and nature has attracted widespread attention from all walks of life, and “green design” has become the focus of global attention [4]. Tobacco, as one of the country’s important economic crops, not only has a complete range of types, including air-cured tobacco, soil tobacco, flue-cured tobacco, self-ribbed tobacco, oriental tobacco, etc., it is of good quality and its output is also among the top in the world [5]. The modern tobacco processing industry in the country has developed from hand-made silk, to hand-rolled cigarettes, machine-made cigarette production, and tobacco production technology has been developing and progressing, and tobacco management has gradually improved, and various policies have been implemented. It is more conducive to safeguarding the interests of the country and the health of the people [6]. The development of

tobacco is not only shown in production technology and national policies, but also in the visual image design of cigarette labels [7].

In the field of domestic design art, most of them have used macroscopic historical expressions to study the national modern art design, but there is a lack of deep-level reasons for the development process and artistic theory research, so I choose the visual image of the national modern cigarette label design issues, in-depth study of the historical reasons, design theories and cultural connotations have certain social significance [8]. Western design thoughts and advanced technology are also gradually influencing the country's fine arts and design circles. The advancement of Western design ideas has been absorbed by some domestic designers and applied in the visual image design of cigarette labels. In order to achieve high-efficiency post-processing and production, this has also played a role in boosting the development of modern national cigarette labels [9]. Many designs in the country are also constantly trying to incorporate international elements into the characteristics of the nation, but it takes a lot of effort to design high-level works, and strive to absorb excellent foreign ideas under the historical background of the country's traditional culture [10].

This article systematically introduces the concept, origin and development of green design, and on this basis, summarizes the methods, principles, trends and the role of designers in green design; and then elaborates on the concept of green design for product design. The specific requirements of the product design under the green design principle, are namely the material selection concept, styling concept, functional concept and color texture design concept, etc.; then for the application case study, a simple green design analysis was made on the work experience. The first step: collect and sort out the literature, consult various documents and image data on green design, and analyze the characteristics of various aspects of green design; the second step: analyze the green design in the product field, and study all aspects of green design to product design; the third step: system analysis, put the design of green products into the human-society-environment for systematic analysis; the fourth step: case demonstration, through the case of excellent green design, to demonstrate the method of summary and induction. Finally, the main research work, conclusions and prospects of this article are presented. It is stated that the development of green design requires the overall improvement of national awareness, the formulation of government industrial policies and related laws and regulations, the improvement of the sense of responsibility of enterprises, and the consumption of consumers.

2 Related work

Europe can be said to be the birthplace of green design, and the degree of industrialization of green design in Japan and the United States is relatively high. Researchers put forward different green indicators in the process of improving green design [11]. Among them, the American Society of Manufacturing Engineers (SME) can be called the blue book of green manufacturing. The book formally gave the new concept of green manufacturing, and made a systematic and detailed description of green manufacturing [12]. Trochim [13] found that some colleges and universities not only set up special institutions to study environmental awareness design, but also set up special websites for systematic inquiry of green design. Scholar Klompas [14] combines statistics and products cycle, concurrent engineering, and multi-objective decision-making technology have made systematic and strict quantitative analysis of a series of links such as product design, manufacturing, use and disposal, and further optimized the way of designing green products. Subsequently, the International Organization for Standardization established ISO14000 series of standards are used to better manage the environment and promote green design [15]. The establishment of this standard has strongly promoted the development of green design. Accepted by the country, with the development of the times, the standards are further improved, and more and more countries are accepted. According to Keller [16], various industries have also rushed to introduce various green design standards. Take visual communication design as an example: relevant American colleges and universities published the "Guide to Environmental Responsibility in Graphic Design" and drafted the "Design Ecology Manual". The establishment and implementation of these documents are greatly beneficial to the environment. Lempert [17] believes that Japan is in packaging major reforms have been carried out in the previous year, and green design has been widely used in packaging. This process has formed a cycle assessment system for the package life. In addition, Japan published the "ISO14000 Album", which is the international packaging industry. The green design specifications of the company have made great contributions. In recent years, a variety of green packaging materials have been continuously developed and utilized, and advanced countries in Europe and the United States have formed a relatively complete green packaging system.

In terms of product design: many universities are at the forefront of green design. Lempert [18] found that, through cooperation with many large domestic and foreign companies, these universities have carried out green design transformations on a series of large household appliances such as refrigerators, air conditioners, TVs, etc., and conducted in-depth research on the evaluation system of green products, and achieved phased results. With the wave of green design sweeping, some influential companies at home and abroad, such as Toshiba, Sony, Sanyo in Japan, DELL, IBM, and other companies in the United States, have already valued the greenness of their products, and have established corporate green purchasing, while conducting research and development of

green technology, and applying these latest achievements to its own products. However, since the country's industrial development is basically still in the middle and late stages of the industrial revolution, the conversion of green design to actual product applications is still relatively weak. Moreover, the supporting tools and application data for green design are relatively scarce, so so far there has not been a complete set of practical application system for green design, nor has it independently developed green products that fully consider environmental protection and energy saving.

In terms of visual communication design: the national paper bag packaging industry is relatively backward, and the mainstream shopping bags on the market are still plastic shopping bags, which brings great difficulties to the post-processing of plastic bags after recycling [19]. In addition, the state's technology in the recycling and reuse of packaging resources has basically remained at the original stage, the reuse rate is relatively low, and the widespread problem of waste is relatively serious. At the end of the last century, the country's recycled paper packaging accounted for only 20%, the plastic packaging recycling rate was only 10%, the glass bottle recycling rate was also only 20%, and the metal packaging recycling rate was even less than 10%. It can be seen from the data that the country's use of green design on packaging is not very ideal [20]. Therefore, the country had put forward some specific indicators: the total recycling rate of packaging materials should reach 43%. Among them, the recycling rate of paper packaging should reach 40%, and the recycling rate of plastic packaging should be 40%, while glass packaging must reach 50%, and metal packaging must reach 60% [21].

3 Construction of the visual element model of the cigarette label design based on the green concept

3.1 Matching factors of cigarette label design

Cigarette labels refer to the outer packaging materials applied to various tobacco products, including seals, trademarks, etc. In the early collection circles, cigarette labels were commonly called cigarette boxes, cigarette papers, or cigarette shells. Many common names are uniformly named as "cigarette labels" because the names of cigarette boxes and cigarette shells ignore their functions as trademarks, and only indicate the outer packaging form of cigarettes, so they are not comprehensive enough. As a collection of many fans, the cigarette label has lived up to expectations and has become one of the "world's four major flat collections". The other three collections are stamps, sparks and wine labels. Figure 1 shows the distribution of matching factors for cigarette label design.

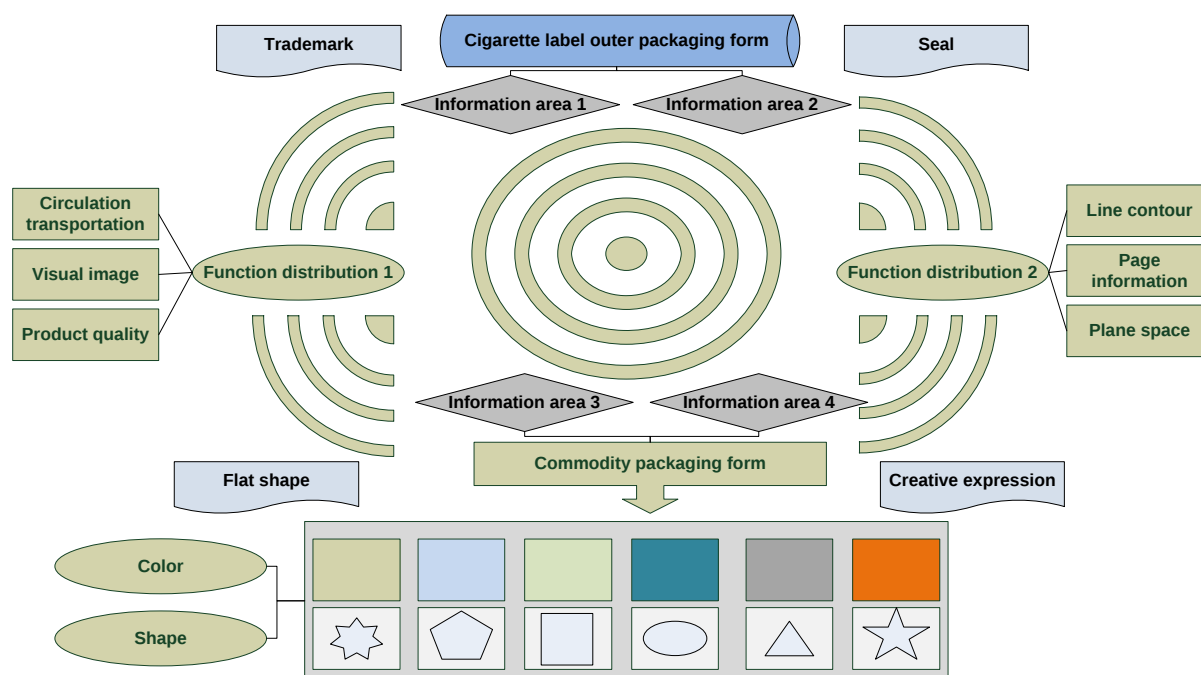


Figure 1 Distribution of matching factors for cigarette label design

The main function of cigarette labels is to serve as the outer packaging of tobacco. At the beginning, the packaging was created to protect the products and reduce the damage they suffered during circulation, transportation and storage. With the development of society, packaging has become a consumer's responsibility for the products. The first impression is becoming more and more important. When people buy a product, they will first use the packaging visual image design to guess the quality of the product. Therefore, how to capture

the consumer's attention from the first glance is the most important part of packaging design.

$$X[n] = \{x(1), x(2), \dots, x(n)\}, n \in N \quad (1)$$

$$x' - \frac{x(i) - \min(x)}{\max(x) - \min(x)} = 0 \quad (2)$$

In the sub-index "efficiency input[x]" of browsing ease of use, we introduce "search depth output[x]" for evaluation, and the value of search depth is directly proportional to efficiency. The "number of fixation points" in the eye tracking data is negatively correlated with the "search depth", and the search depth formula is defined as:

$$\begin{cases} \text{input}[x] = [0, 1, 2, \dots, x] \\ \text{output}[x] = [0, 1, 2, \dots, x]^T \end{cases} \quad (3)$$

Visual modeling elements include points, lines, surfaces, bodies, and colors, among which "line" is an important visual modeling element x(i). Starting from the visual characteristics of the line, it analyzes the expression technique of the "line" in the modeling design, and summarizes the creative expression technique of the "line" through a large number of examples. Points, lines, areas, and bodies are the basic elements of visual expression.

$$Y = \frac{1}{n} * \sum_{i=0}^n (x(i) - x)^2 \quad (4)$$

"Task time" and "search depth" are used as two behavioral data to comprehensively evaluate the sub-indicator "efficiency U(x)". E-commerce web pages should reduce cognitive load in visual design, improve user search efficiency, and make browsing behaviors smoother. In addition, to evaluate the performance of web browsing usability, the user's behavior data and perceptual evaluation data should be considered comprehensively.

$$U(x) = a(0) + a(1) * x(1) + a(2) * x(2)^2 + \dots + a(n) * x(n)^n \quad (5)$$

Color in flat design is no longer just a visual embellishment, it has become an important part of page information content recognition. In the operation interface, the designer uses the contrast between bright colors and high grayscale colors to make the information content more eye-catching and make users' operations faster. Due to the inconsistency of data units such as search time, search depth, and perceived effectiveness in efficiency and effectiveness indicators, direct addition cannot be performed. Therefore, for such data, we use (1-reciprocal) data for statistics, such as search time calculation formula:

$$S = \begin{bmatrix} a(1) * x(1) & 0 & 0 \\ 0 & \dots & 0 \\ 0 & 0 & a(n) * x(n)^n \end{bmatrix} \quad (6)$$

The color function S in flattening is mainly reflected in the following aspects: in the past, closed wireframes were used to divide the information area in the previous interface. The flattening reduces the boundary distinction between the information modules, and strengthens the information in the form of color blocks. The internal hierarchical relationship makes full use of the user's perception of color. We use bright colors to emphasize the main body of the information, and use color changes such as gradients to emphasize the subordination or primary-secondary relationship of the information.

3.2 Hierarchical distribution of green concepts

Green design here means that in a design process, environmental factors are regarded as design goals or opportunities rather than constraints. The main point is to combine environmental issues while minimizing the loss of product performance, service life, functions, etc. The two basic goals are waste prevention and material management. Green Design is also called Ecological Design, Design for Environment, and Environmental Conscious Design, which refers to In the entire life cycle of the product from design to scrap, the environmental attributes of the product, such as disassembly, recyclability, reusability, maintainability, etc., are taken into consideration as design goals. At the same time, the required functions, quality, and service life of the products should be guaranteed. Choosing healthy and environmentally friendly fabrics is the basis for fashion design. Natural and environmentally friendly fabrics are more common in country, such as cotton, linen, wool, silk fabrics, etc. The use of traditional fabrics, such as some handmade fabrics, summer cloths, and good plants, is promoted. Although the production is slightly complicated, it also determines the durability of the fabric. In addition, some new natural fabrics are scientifically developed plant fabrics extracted from our usual food, tea, etc. This is the development and application of a biodegradable material. These fabrics have almost zero

environmental pollution after use. Figure 2 shows the hierarchical distribution framework of green concepts. It can be seen from the above concepts that the basic idea of green design is to incorporate environmental factors and pollution prevention measures into the product at the design stage, take environmental performance as the design goal and starting point of the product, and strive for the product's physical properties such as function and quality. The impact on the environment is minimal under the premise of the same.

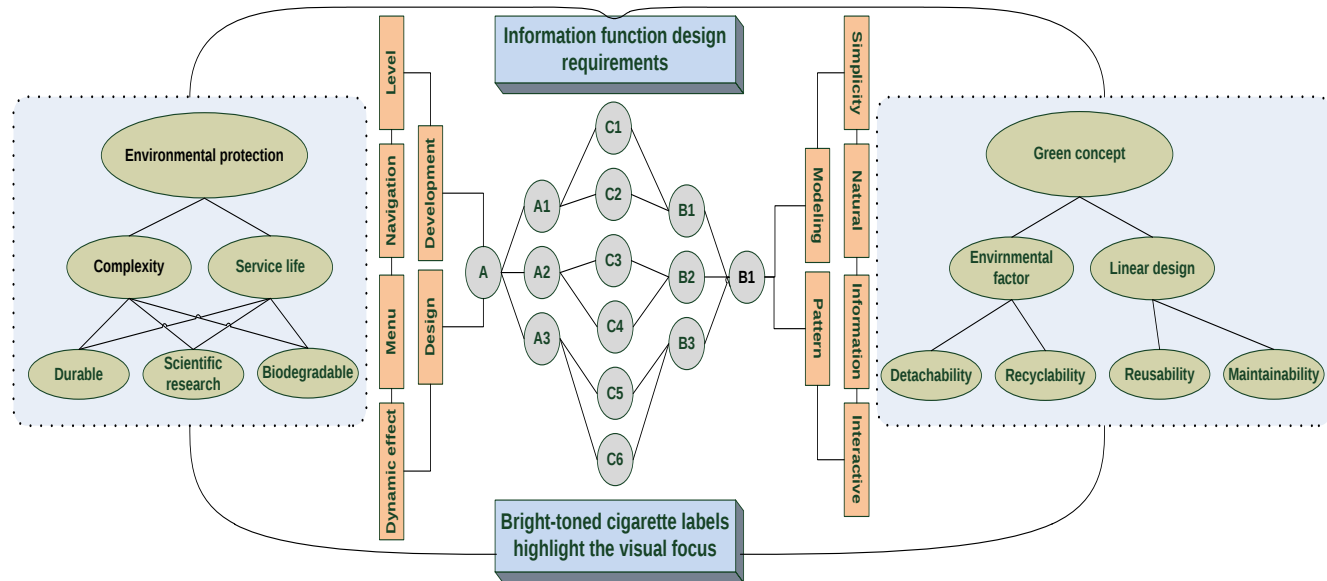


Figure 2 Green concept hierarchy distribution framework

The most distinguishing feature of procedural knowledge from declarative knowledge is that it is biased towards knowledge of some skills or procedures. How to complete the knowledge representation of a thing is the process of acquiring a skill, and the practical significance of procedural memory is very great. The changes and combinations of the three elements constitute the ever-changing fashion styles. Designers use green elements in fashion, and mainly design in three elements: in fabrics, choose natural, non-toxic, harmless or renewable and recyclable fabrics; in terms of modeling, reduce excess design as simple as possible. Functionality is considered in the design of the process structure: in terms of color, natural and simple colors are selected, and environmentally friendly dyeing and weaving methods are promoted. It can be mastered through many attempts and practice of a certain behavior activity in a task. After acquiring this skill, we can extract it from the program memory at any time when we need to use it. There is a large amount of information in the system or chart interface, and there are many functional modules. Colors and graphics can guide users to obtain information. In the system page, gray is used to set off the hierarchical relationship of the chart, and bright tones are used to emphasize the visual focus or interactive methods. The user's visual search task is mostly simulated as a sequential search method, ignoring the role of stimuli (color, shape), because the highlighted target stimulus will have an impact on the user's visual search strategy. The use of bright colors in flattening can layer information on the page. This understanding of information architecture can be completed only by using a low-level bottom-up visual search mechanism, and does not require too much attention from users. From the analysis results of flat interface elements, visual objects such as icons, navigation, and menus in flat pages express information in the form of color blocks and lines. Dynamic effect design uses color and geometrical changes to attract users.

3.3 Optimal processing of visual elements

The visual system is an information processing system with limited resources. At any time, visual attention can only select limited information in the external environment for processing. The factors that affect selective visual attention may be either stimuli with distinctive features in the visual scene or the individual's current subjective intentions or mission goals. In the process of browsing the web, our vision system continuously acquires and processes a large amount of information. Some information will be further processed into the graphics we need by our attention, and most of the information will be ignored by the vision plus system. The life cycle method is an important green design method. It means that from the conceptual design stage of the product, the product life cycle including design and development, production and use, and disposal after disposal are considered to ensure that the requirements of the product's green attributes are met. The production of green products will go through many processes from design to production, in which life cycle methods have

the greatest relationship with product “greenness”. Modern enterprises will face global competition, and the green index of products is also one of the main categories of competition. Products only have good environmentally friendly performance throughout their life cycle to ensure an invincible position in the competition. It is this kind of competition that promotes the fundamental transformation of product design concepts to green design. The concurrent engineering design method is similar to the life cycle design method. The difference is that the concurrent engineering design method is a systematic method of modern product development and is slowly transformed into a model. Since the evaluation indicators of different visual elements have different units, this situation will affect the results of data analysis. In order to eliminate the impact of unit differences between indicators, it is necessary to normalize the original data so that the questions of the indicators are in the same magnitude. This article chooses the most representative min-max normalization method, the principle of which is to linearly change the original data and map the result value between $N[0, 1]$.

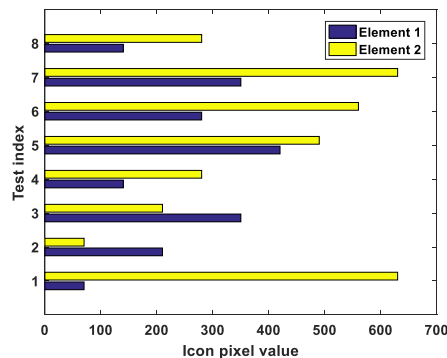


Figure 3 Test histogram distribution of cigarette label pixel value

Figure 3 shows the histogram distribution of the smoke label pixel value test. The data used for model training and testing is selected from all the questionnaire survey data according to the research object. All the materials are produced pages, the page width is the same, the size is 1440 pixels x 1680 pixels, the effective content width is 960 pixels, the two sides are left blank each 240 pixels, and the height of the screen is 840 pixels. The page is a 5x4 matrix layout, each page has a total of 20 products, the header and bottom of all pages are consistent, and the color tone is uniform. All pictures come from a pre-prepared material library, and product pictures are randomly selected from the library. In order to avoid the impact of image characteristics on attention, all the pictures are non-model, white background pictures. For example, if you want to study the perception model of the female designer population for non-standard data, then select all female designers for all non-standard data samples and use them as the entire data set. After that, the entire data set is randomly divided according to the ratio of 3:1, and 3/4 of the data of the entire data set is selected as the training data, and the remaining 1/4 of the data is used as the test data. In order to fairly judge the effect of the neural network model, first use the training data to train the model, and then use the test data to test the predictive ability of the model. There is no intersection between the training data and the test data. Modular design refers to the division and design of a series of functional modules on the basis of functional analysis of products with different functions or the same function, different performance and different specifications within a certain range, which are constituted by different choices and combinations of these modules. Products with different properties can meet the requirements of use under different conditions. Modularization can shorten the design and manufacturing cycle, reduce production costs, and standardize product specifications, which not only improves product quality, but also accelerates product upgrading.

4 Application and analysis of visual element model of cigarette label design based on green concept

4.1 Requirement analysis of cigarette label design

According to the concept of green, the impact performance of packaging is produced by the appropriate harmony of colors and reasonable scientific contrast of colors. Products with superior packaging impact performance are popular in the market, and their colors are soft and not dazzling. Reasonable color comparison requires a good color contrast, brightness contrast, purity contrast, cold and warm contrast, area contrast, and comprehensive contrast, so that the packaging is eye-catching and not fancy and not dazzling, making people feel comfortable and achieving a good packaging effect. According to Kansei Structure, we first collect the emotional words used to describe the visual design of web pages in previous studies, and delete very similar emotional words, and keep 30 pairs in total. Each pair of perceptual words are antonyms. Then we hired a total of 10 visual designers and design students, and asked them to select 12 pairs of emotional words from 30 pairs of emotional words that can accurately describe the visual design of the 85 e-commerce operation page samples.

After statistical screening, the 10 most selected emotional words are used for web visual scoring: “monotonous, colorful”, “concise, complex”, “low-density, high-density”, and “tidy, messy”, “simple and gorgeous”, “low price and high price”, “flat and eye-catching”, “calm and lively”, “low design and high design”. Figure 4 shows the fan-shaped distribution of satisfaction with the visual design of cigarette labels under different standards.

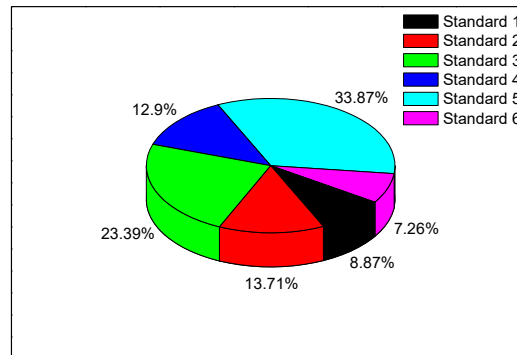


Figure 4 Fan-shaped distribution diagram of visual design satisfaction of cigarette labels under different standards

The user scores the sample of the operation page through questionnaires (sensitivity words, overall visual aesthetics). The user browses the page samples one by one through the questionnaire, and then scores “1 to 3” perceptual words and visual aesthetics. The emotional word score includes 10 pairs of antonymous emotional words, so scores of 1 and 7 correspond to the two ends of the antonym. A score of 1 means completely inconsistent, and a score of 9 means completely compliant. Figure 5 shows the three-dimensional histogram distribution of cigarette design scores for different age groups. The questionnaire is distributed to young people aged 18-35, including users of different genders, occupations, regions, and incomes. All users have more than 3 years of design experience. A total of 128 questionnaires were collected, with 32 questionnaires on each set of pages and 30 valid questionnaires.

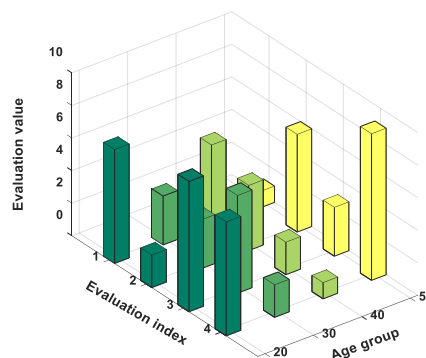


Figure 5 The three-dimensional histogram distribution of cigarette design scores for different age groups

In order to achieve a better data fitting effect, this paper uses regression equation and neural network two methods to achieve aesthetic performance evaluation and compare the prediction effect. In the font design, the beautiful shape of the text structure is the foundation, and the text structure should be full of modern beauty. This is the most basic requirement. But it does not mean that all text designs must have obvious artistic features, but must be based on the requirements of the picture and publicity. It is required to design text. If it is necessary to beautify in the design, we use artistic characters to beautify, and use ordinary fonts directly if there is no need to beautify. The color of the text should also be determined according to the overall needs of the screen, and the color processing should always adhere to the principle of harmony and unity and the color principle of the green design concept. The correlation analysis of overall aesthetic perception and perceptual words shows that most of the 10 perceptual words are highly related to the user's aesthetic perception.

4.2 Visual element function simulation

Through the above research, it is found that the existing cognitive model pays attention to the endogenous characteristics of user behavior when simulating visual search tasks, and ignores the impact of interface element presentation on user cognition. In the model, the user task is decomposed into sub-goals, and the relevant information is searched according to the sub-goal features one by one. This top-down sequential processing

mechanism will occupy a large amount of memory resources, resulting in unsatisfactory simulation results. This experiment uses the eye tracking data in the experiment to analyze the user's visual search strategy and improve the cognitive model. Figure 6 shows a comparison chart of the saliency horizontal line of visual elements. This experiment mainly tests the relationship between the size of the icon array and the change in the thickness of the icon wire frame and the icon search response. The independent variables mainly include: (A) the thickness of the graphic wire frame and (B) the size of the icon array. The factor A has 5 levels (0.3, 0.26, 0.24, 0.32, 0.40). The unit is pixel (P), factor B has 5 levels (0.33, 0.41, 0.35, 0.26, 0.37). The dependent variable is user reaction time (RT). The color and graphics of the icon each have 7 basic elements.

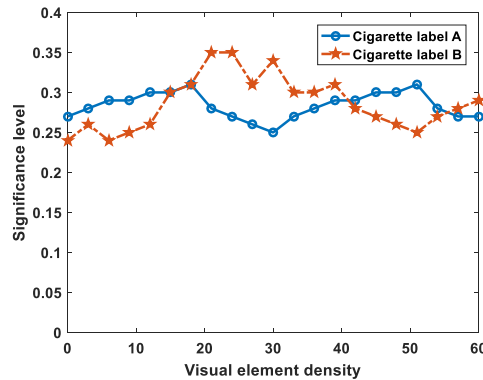


Figure 6 Contrast chart of saliency horizontal line of visual elements

There are two influencing factors in this experiment. In order to make every repetition or complete experiment in the experiment, all possible combinations of the two factor levels can be tested, so the factorial design experiment method is adopted. The effect of a factor is defined as the change in the response when the level of this factor changes. In the experiment, the main effect is preset to wire frame thickness A and icon array B. When the level response of factor A changes with the level of factor B, it indicates that there is an interaction between factors A and B. The effect of the interaction is the mean of the two main effects. The interaction is manifested as a curved form in the response surface in the experiment. When there is only one factor in the experiment, the response surface is a curve in two-dimensional space; when there are two factors, the response surface appears as a curved surface in three-dimensional space.

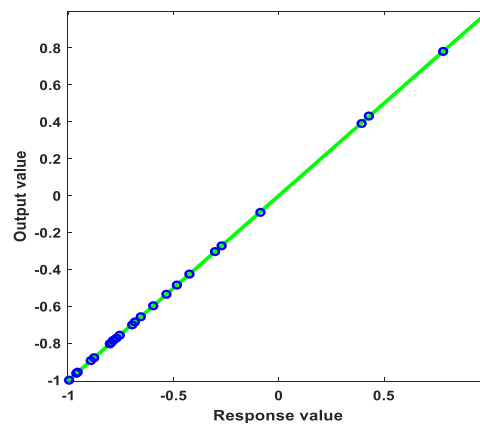


Figure 7 Linear fit of the output value to the response value

This experiment uses Response Surface Methodology (RSM) to analyze the experimental variables. RSM is the product of the combination of mathematical methods and statistical methods, which can model and analyze multiple variables, and its ultimate goal is to optimize the response value p . Figure 7 shows the linear fit of the output value to the response value. Under the same level of independent variables A and B, the position of the icon and the text of the icon are randomly combined, and 5 targets are randomly selected for repeated experiments. We set the same wire frame thickness as a group of experiments, there are 7 groups of experiments, the subjects rest for 20 seconds at the end of each experiment, and it takes about 20 minutes for one subject to complete the experiment. The response time is when the search page appears until the user clicks the space bar to end the search task, and the software only records the response of the target search page. We use multiple regression analysis to analyze the relationship between satisfaction (dependent variable) and aesthetics, ease of use, and usefulness (independent variable), and determine the degree of explanation of each independent variable to the dependent variable and the relationship model. It can be seen that the model summary table of the

result output shows the fit of the model, where the correlation coefficient reflects the degree of linear correlation between all the independent variables X and the dependent variable Y. The coefficient of determination R is 0.702, indicating that 70.2% of the variation of the dependent variable can be explained by the independent variable.

4.3 Example application and analysis

The Tobii X2.30 eye tracker was used in the experiment, developed by the Swedish developer Tobii Technology. This eye tracking system is fully functional, adopts high-tech and has stable tracking capabilities. The eyes can be easily captured by fixing it at the bottom of the computer screen, and the subjects performed the experiment in a natural sitting state. Accurate eye tracking data can also be obtained under a large viewing angle (near 360), which supports eye tracking research using large screens or real objects. The eye tracking software is equipped with data analysis software, and provides functions such as data statistics and data output. It can be used for interface usability, product market research, and research on user visual attention and eye movement patterns. The experiment was carried out in a noise-free, low-illumination n tower (40W fluorescent lamp) environment. The eye tracker was adjusted according to the sitting posture of the subjects, and the subjects were allowed to complete the experiment in a relaxed sitting position as much as possible. The subjects' eyes should be as flat as possible with the center of the screen. The distance from the eyes to the screen is about 65-70cm. The pixel of the computer display screen is 1028 x 1024, and the refresh frequency is 75Hz. In this experiment task, 25 subjects are selected, all of whom are school students, aged between 23-27 years old, with an average age of 24.5 years. The task is for the subject to memorize the target icon first. After pressing the space bar, a set of test icons appears on the screen, and the system starts timing. After the subject finds the target icon, we press the space bar to confirm. If you don't click the space bar, you will stay on the page. Figure 8 shows the satisfaction deviation box plot of different test groups.

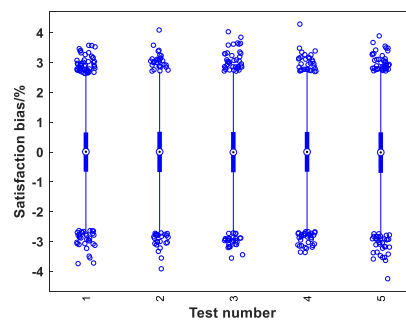


Figure 8 Satisfaction deviation box plot of different test groups

Preliminary analysis was performed on the measurement data of 25 subjects using Excel tools. Considering that the purpose of this experiment is to measure the difference in user reaction time under different wireframes and different icon arrays. Finally, the data of 20 subjects were screened as valid data for analysis. In the 5 levels of the thickness of the variable wire frame, the icon array is 3 x 3, and 5 random measurements. Through the data model, the linear relationship between the independent variable and the dependent variable can be determined, and the size of the icon array and the relationship between the icon wireframe and the user's cognitive response can be seen. The user's eye tracking and heat map can help us analyze the search strategy used by the user during the search task. The distribution of the user's gaze point can reflect the user's cognitive processing mechanism to a certain extent, and compare the previous related models. While verifying the scientificity, the research also provides suggestions for the improvement of the model. Both pictures show that the residual variance is slightly different at different levels. When the icon wire frame thickness is between 1.6~3.2px and when the icon array is 5 x 5, 6 x 6 and 7 x 7, there is a larger residual value than other cases. Residuals are the observed values of the degree of model error. Although there are several residuals with large values and no obvious problems occur, these responses can be recorded as real data, because these values will not affect the analysis of experimental conclusions.

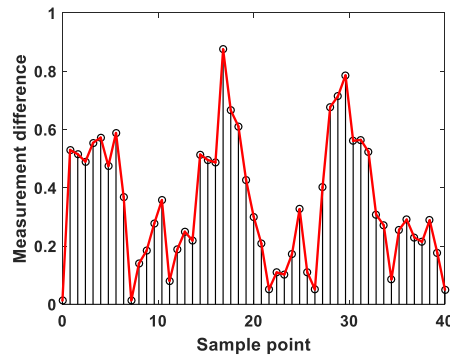


Figure 9 Statistical distribution of measurement residuals for different sample points

Model is a regression analysis of independent variables and satisfaction, in which aesthetics, ease of use, and usefulness all have significant effects on satisfaction. Figure 9 shows the statistical distribution of measurement residuals for different sample points. The regression coefficients of the interactive item aesthetics chapter commodity category, easy-to-use lucky commodity category, and useful commodity category are 0.325 (corps < 0.001) and 0.132, respectively, indicating that the product category plays a positive role in the impact of aesthetics and ease of use on satisfaction, and the product category plays a positive role in the effect of usefulness on satisfaction. The method of residual analysis should be used to test the suitability of the model before performing analysis of variance on the data. The residual refers to the difference between the measured data of the experiment and the predicted value of the model, and the probability that the standardized residual of the experimental point falls outside the $(-2, 2)$ interval. If the standardized residual of a certain experimental point falls within $(-2, 2)$, it can be judged as an abnormal experimental point with 95% confidence, and it will not participate in regression. There are as many pairs of residual values as there are pairs of data. The residual difference layout of the data is directly given in the Design-Expert software.

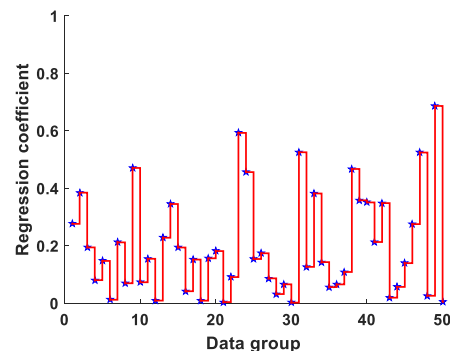


Figure 10 Ladder diagram of regression coefficients for different data groups

Figure 10 shows a ladder diagram of regression coefficients for different data sets. Each point represents the measured value of the reaction. From the figure, it can be seen that the scattered points show an average trend, indicating that the residuals obey the average distribution. It shows the relationship between the residual and the fitted value of the dependent variable. It can be seen from the figure that when the response time increases, the residual variance has a weak increasing trend. The residual variance value is basically within the $(0, 1)$ interval, indicating that the model simulation is indeed feasible.

5 Conclusion

This paper designs green products that are technologically advanced, economically reasonable, and environmentally friendly, so that they can not only meet people's needs, but also ensure the safety and continuity of their needs, and coordinate the balance of development among people, society and the environment. Green design cultivates people's correct consumption and life concepts, and makes low-carbon economy and green life possible. Green design is used to solve the increasingly prominent problems such as the destruction of the social environment and the deterioration of resource conditions, so as to realize the healthy and orderly development of society. The design that is coordinated with the times is the green art design, which uses artistic visual techniques to promote environmental protection awareness, convey the people-oriented development concept and the concept of sustainable development. This article focuses on the research and discussion of the graphic design elements in packaging design, and proposes graphics. Simplify design overcomes complex and cumbersome practices and ideas, and expresses ideas directly, clearly and powerfully, and eliminates confusion

and ambiguity; concise design and clear ideas reflect the green awareness of artistic design. On the standard product page, the three perception factors and satisfaction have a significant correlation. Usefulness has the greatest impact on the overall evaluation, followed by aesthetics and usability. Therefore, when designing the operation page of standard commodities, the superiority of information is the most important to users, and the influence coefficient is shown in paper. The design needs to pay attention to the regional settings of the product information content, so that users can easily obtain product information, without over-emphasizing the beauty of the page and the richness of visual styles. The study found that the inherent color of the material in the color application of the green design concept is the most environmentally meaningful design color; the text should be concise and clear, and the artistic treatment should meet the overall requirements of the screen and the requirements of the green concept. The actual situation and needs should be placed in the packaging screen, which should conform to the logo use specifications and the screen art: on the basis of discussing each element, each element has symbolic characteristics, and the connecting screen of each element must conform to the symbolic design principle, organically reflect the design requirements function.

References

- [1] Ophir Y, Brennan E, Maloney E K, et al. The effects of graphic warning labels' vividness on message engagement and intentions to quit smoking[J]. *Communication Research*, 2019, 46(5): 619-638.
- [2] DiFranza J R, Clark D M, Pollay R W. Cigarette package design: opportunities for disease prevention[J]. *Tobacco induced diseases*, 2020, 1(2): 1-14.
- [3] Wackowski O A, Sontag J M, Hammond D, et al. The impact of E-cigarette warnings, warning themes and inclusion of relative harm statements on young adults' E-cigarette perceptions and use intentions[J]. *International journal of environmental research and public health*, 2019, 16(2): 184.
- [4] Yang B, Owusu D, Popova L. Testing messages about comparative risk of electronic cigarettes and combusted cigarettes[J]. *Tobacco control*, 2019, 28(4): 440-448.
- [5] Riley D, da Silva P M, Behr S. The impact of packaging design on health product perceptions[J]. *Marketing and Business Development*, 2019, 1(1): 81-89.
- [6] Moodie C, Gendall P, Hoek J, et al. The response of young adult smokers and nonsmokers in the United Kingdom to dissuasive cigarettes: an online survey[J]. *Nicotine and Tobacco Research*, 2019, 21(2): 227-233.
- [7] Hwang J, Yang Y, Oh Y, et al. Differences in visual fixation duration according to the position of graphic health warning labels: An eye-tracking approach[J]. *Tobacco induced diseases*, 2018, 1: 6-9.
- [8] Chen C F, Liu T, Huang K C. Characteristics of warning labels for drug containers and their effects on perceived hazardousness[J]. *Safety science*, 2018, 78: 149-154.
- [9] Dooner H K, Keller J, Harper E, et al. Variable patterns of transposition of the maize element Activator in tobacco[J]. *The Plant Cell*, 2019, 3(5): 473-482.
- [10] Chan K, Chang H C. Advertising to Chinese youth: A study of public service ads in Hong Kong[J]. *Qualitative Market Research: An International Journal*, 2019, 2: 11-13.
- [11] Agariya A K, Johari A, Sharma H K, et al. The role of packaging in brand communication[J]. *International Journal of Scientific & Engineering Research*, 2019, 3(2): 1-13.
- [12] Rosbrook K, Green B G. Sensory effects of menthol and nicotine in an e-cigarette[J]. *Nicotine & Tobacco Research*, 2018, 18(7): 1588-1595.
- [13] Trochim W M K, Milstein B, Wood B J, et al. Setting objectives for community and systems change: an application of concept mapping for planning a statewide health improvement initiative[J]. *Health promotion practice*, 2018, 5(1): 8-19.
- [14] Klompas M, Speck K, Howell M D, et al. Reappraisal of routine oral care with chlorhexidine gluconate for patients receiving mechanical ventilation: systematic review and meta-analysis[J]. *JAMA internal medicine*, 2019, 174(5): 751-761.
- [15] Sun L, Hu L, Zheng F, et al. Influence of HNB Product Packaging Health Warning Design on Risk Perception Based on Eye Tracking[J]. *Human-Computer Interaction*, 2021, 1: 390-402.
- [16] Keller J, Lim E, Dooner H K. Preferential transposition of Ac to linked sites in Arabidopsis[J]. *Theoretical and Applied Genetics*, 2019, 86(5): 585-588.
- [17] Lempert L K, Glantz S. Packaging colour research by tobacco companies: the pack as a product characteristic[J]. *Tobacco control*, 2018, 26(3): 307-315.
- [18] Kempf D S, Harmon S K. Examining the effectiveness of proposed cigarette package warning labels with graphic images among US college students[J]. *Academy of Marketing Studies Journal*, 2019, 10(2): 77-93.
- [19] Iles I A, Pearson J L, Lindblom E, et al. "Tobacco and water": Testing the health halo effect of Natural American Spirit cigarette ads and its relationship with perceived absolute harm and use intentions[J]. *Health communication*, 2021, 36(7): 804-815.
- [20] An R, Liu J, Liu R, et al. Impact of Sugar-Sweetened Beverage Warning Labels on Consumer Behaviors: A Systematic Review and Meta-Analysis[J]. *American Journal of Preventive Medicine*, 2020, 1: 12-17.

- [21] Johnson M W, Bickel W K, Kirshenbaum A P. Substitutes for tobacco smoking: a behavioral economic analysis of nicotine gum, denicotinized cigarettes, and nicotine-containing cigarettes[J]. Drug and alcohol dependence, 2020, 74(3): 253-264.