Highlights in Art and Design
ISSN: 2957-8787 | Vol. 3, No. 2, 2023

Analysis of the Importance of Statistical Methods for Art Design

Juqing Deng [1, 2, *]

[1] Wuxi Vocational institute of Arts & Technology, Yixing, Jiangsu, 214206, China
[2] Philippine Christian University, Manila 0063, Philippine

*** Corresponding author Email:** Dengjuqing52728@163.com

Abstract: Based on the differences between statistics and art design, and through the intersections of its application and service fields, This paper expounds the importance of statistical methods to artistic design from five aspects: data collection method makes artistic design have a broad market base, quantitative analysis method makes artistic design have a clear direction, qualitative analysis method makes artistic design more profound and efficient, variable analysis method makes artistic design more creative and breakthrough, and dialectical unity of quantitative and variable makes artistic design more vital. It is proved that statistical methods can make artistic design products more scientific and targeted in the process of design and development, and can provide a guarantee for them to better open their minds, achieve breakthroughs and reflect social values.

Keywords: Data Acquisition Method; Osborne Check List Method; Quantitative Analysis Method; Qualitative Analysis Method; Variable Analysis Method.

1. Introduction

As we all know, statistics is a science about understanding the overall quantitative characteristics and quantitative relations of objective phenomena, while art design is the application of the beauty of art form in the design of environment, products, advertising, clothing and other closely related daily life. The two seem to be two unrelated fields, but they involve many fields such as society, economy, science and technology and market. There is no way to avoid their intersection. The data analysis of statistical science, the inference and prediction of the essence under the surface are of great significance to the development direction of art design. The following are five aspects to elaborate the importance of statistical methods for artistic design.

2. Data Collection Method Makes Art Design have a Broad Market Base

The development of any piece of art design is oriented by a wide range of market needs, so early in-depth research and data collection is an essential link. Data collection is mostly through observation, investigation, literature retrieval, experiment, network information and other ways, and the collected data is mainly in the form of pictures, text, questionnaires, voice and so on. For a large number of data, it needs to be sorted out and summarized to get clear results. And statistics on the basic data with 1 and 0 and other specific symbols to classify attributes of the internal relationship method (such as "1" means married, "0" means unmarried, "1" means male, "0" means female), the behavior data with time, Angle, step or frequency value to express the method (such as a0, a1..... An-1, the form of an represents the relationship between values). For subjective data, the scoring and evaluation system is used to analyze the fuzzy data such as emotional response, aesthetic feeling and satisfaction (for example, the seven values of -3, -2, -1,0,1, 2,3 represent satisfaction, with -3 being the least satisfied and 3 being the most satisfied) to measure the subjective abstract and perceptual fuzzy information. As well as the method of induction and extraction of direct data in the form of lists, the method of induction and search for rules of picture data according to the reference object, time sequence and other tree charts, etc., these data collection and analysis methods can make various forms of data intuitively present the relevant attributes, rules, characteristics, evaluation and demand, etc. Can provide the broadest market demand base for the development of any piece of art design.

3. Guantitative Analysis Makes Artistic Design have Clear Direction

The quantitative analysis method as a basic way of thinking to analyze problems started from Galileo, who replaced the subjective analysis of the cause and result of things with experiments, formulas and numerical symbols, making the object of human cognition from vague to clear, from abstract to concrete. It was Galileo's most profound and fruitful revolution in scientific methodology. It can be seen that quantitative analysis is a method to analyze the quantitative characteristics, quantitative relations and quantitative changes of social phenomena. It includes ratio analysis, trend analysis, structure analysis, mutual comparison and mathematical model. Among them, ratio analysis is the foundation, while trend analysis, structure analysis and comparative analysis are the extension. Mathematical model method represents the development direction of quantitative analysis. Therefore, the biggest function of quantitative analysis is to reveal and describe the interaction and development trend of social phenomena. It is used in enterprise management to obtain enterprise credit by quantitative analysis of financial statements and investment judgment by quantitative analysis of digital modules. Similarly, if quantitative analysis method is applied to the field of art design, it can be used for quantitative analysis of the relatively stable attributes of function, purpose and demand in the form of quantity, so as to discover a certain phenomenon or law, so as to turn users' emotional needs into

specific and clear goals, so as to make art design have a clear direction. For example, in the lighting design of clothing stores, only by fully considering the positioning crowd, space layout, people flow direction, doors and Windows and other internal quantitative information analysis and existing material characteristics, popular elements, structural volume and other external quantitative information analysis as the basis and support, can more accurately design a more directional and targeted lighting design scheme.

Table 1. Statistical table of lighting conditions of different types of clothing stores

Type	Illumination	Hue	Color rendering index	Decorative spot light
Premium brand store	300LUX	2500-3000K	RA>90	AF15-30:1
General fashion house	300-500LUX	3000-3500K	RA>90	AF10-20:1
Mass-market store	500-1000LUX	4000K	RA>80	-

4. Gualitative Analysis Makes Artistic Design More Profound and Efficient

Qualitative analysis is opposite to quantitative analysis, which includes causality analysis, comparative analysis and contradiction analysis. It is a non-quantitative analysis method which mainly inferences the nature and development trend of things based on the subjective judgment and analysis ability of the forecaster. It mainly includes suggestions of enterprise managers, opinions of external consultants, estimates of sales staff, market testing, group discussion, collective opinion method, Delphi method, quality analysis and attractiveness index, etc. This analysis method mainly involves subjective factors such as common sense, feeling, experience and so on, and constantly revises and supplements on the basis of preliminary opinions. In order to explore the laws and reasons hidden under the phenomena, it can profoundly and efficiently grasp the essence, so it is also called "opinion set method" or "judgment analysis method". The basic procedure is to determine numbers, relationships and attributes -- to describe and identify characteristics, states and changes -- to classify and classify by reference to criteria -- to make definitions and inferences. Similarly, if qualitative analysis is applied to the field of art design, it can be used for qualitative analysis of modeling, expression, feeling and other relatively subjective attributes that cannot be presented quantitatively, so as to discover certain characteristics and development trend under the description of subjective phenomena, and provide effective reference for the design and development of art design products. Make new product development more in line with the current and future period of demand, prolong the life cycle of art design products.

5. Variable Analysis Makes Art Design More Creative and Breakthrough

The word variable comes from mathematics and refers to a quantity that can change. It is usually expressed in non-numeric symbols, such as some Latin letters. A variable is open-ended. It can be a value that is unknown and variable, or it can be the value of a function that you can plug in, the size of which can be observed and measured. It is divided into independent variables selected subjectively by the tester to determine the impact value and dependent variables of the behavior and reaction of the tester in the test process. It can generalize the way to describe the instruction, becoming a simple tool for tracking almost all types of information, and is also the most charming quantity. There are three types of variable analysis: univariate analysis, bivariate analysis and multivariate analysis. The variables in artistic design are allowed to exist on the basis of quantitative changes, such as forms of expression, modeling methods, color shapes, etc. These variables are commonly known as "innovation" in the field of design, which is the embodiment of the particularity of artistic design, as well as the highest stage of artistic design, and also the process of finding the most appropriate variables on the basis of satisfying quantitative requirements. This part of the process is often called the "mother of creation" Osborne checklist method. That is, the subject is guided to think in nine aspects: whether there are other uses, whether they can be expanded, whether they can be reduced, whether they can be borrowed, whether they can be changed, whether they can be substituted, whether they can be combined, whether they can be reversed and whether they can be adjusted, so as to inspire new ideas, develop new thinking, generate new ideas and form new schemes.

5.1. Whether There are Other Uses.

Is there another use for existing methods, materials, or inventions that remain as they are? Is there any other use for a little change? For example, the Boori teddy coat and hat stand, in addition to the storage functions of clothes, bags, scarves and so on, not only adds the function of stable seat and changing shoes, but also has the adjustable function of measuring and recording height, which expands the use of the coat hanger and further opens its sales market.



Figure 1. Boori Teddy coat stand

5.2. Whether They can be Expanded.



Figure 2. DODO chair

That is, whether something can be added to the existing things, such as parts, length, speed, etc., to extend the service life or improve its value. For example, Japanese designer Toshiyuki Kita designed the DODO chair for Italian brand

CASSINA. Its handle adjusts the foot pad, air pressure back, spring adjusts the head rest and other functions can adjust the back of the seat to almost flat, to use as a bed. The design is aimed at the increasing number of home and work environments. As well as home theater and population aging trends.

5.3. Whether They can be Reduced.

That is, whether something can shrink in size, height, weight, omit or compress parts to reduce the occupancy of space. For example, Muji launched a wall-mounted CD player in 1999, which can effectively save space. Listening to music is not restricted by the region. It can appear in any space such as kitchen, toilet, garage, bathroom, etc., so it has been popular for more than 20 years.



Figure 3. Wall mounted CD player

5.4. Whether They can be Borrowed.

That is, whether some other new processes, new materials and new inventions can be borrowed to increase the new application and vitality of the original products. For example, reactive wallpaper, a temperature-sensitive wallpaper that changes color, shows a bright green pattern at a temperature below 15℃. When the temperature reaches 25℃, the branches on the pattern will bloom; When the temperature reaches 35℃, the flowers on the flower branches will be in full bloom. It is the concrete embodiment of improving its value function by using new technology and new material.



Figure 4. Temperature-sensitive wallpaper

5.5. Whether They can be Changed.

Can existing things be changed in color, shape, size, taste, etc.? What happens when you change it? For example, the design elements of the six cultural and creative lipsticks in the Palace Museum come from the blue version of the moonlit Narcissus Tuanshou character pattern singlet coat, the black version from the black silk embroidered butterfly bamboo handle ball fan, the green version from the light green satin embroidered ancient flower jacket, the red version from the magenta satin embroidered hundred patterns, and the yellow version from the bright yellow silk embroidered embroidered embroidered cotton jacket. The white style, derived from the Crane, deer and Spring Picture of Canton Embroidery, is the product of combining the costume elements of the Imperial Palace with the lipstick design. It is a kind of materialization of culture, a declaration of history and color, and a reflection of the modern diversity of traditional culture.



Figure 5. Cultural lipstick from the Forbidden City

5.6. Whether They can be Substituted.

Whether it can be replaced by other materials, parts, energy sources, methods, processes, etc. For example, Japanese designer Toshiyuki Kita successively designed and launched the TAKO Lamp and KYO lamp series and paper lamps in 1971 and 1983. The lampshades are made of traditional Japanese handmade paper. The softness, toughness and natural folds of paper make the lights diffuse and reflect, making them more warm, soft and classical. A good interpretation of Oriental philosophy, this material substitute design not only saved the traditional handmade paper in Japan, but also swept the market for a time.



Figure 6. Handmade paper lamp

5.7. Whether They can be Combined.

Can you combine parts, combine ideas, combine goals, etc., and what effect will it have? Can it be a whole new system? For example, this pencil cap (Sharpcap), a small pencil sharpener with the function of sharpening, extending and cap, the overall length of 52mm, weight of 3 grams, one end of the concave design plays the role of the pen cap to protect the tip of the pen and extend the length, the other end of the pencil sharpener design plays the role of sharpening the pencil in the process of use, in addition, fixed on the pencil is light and small, Convenient storage, achieve a variety of purposes of the combination.

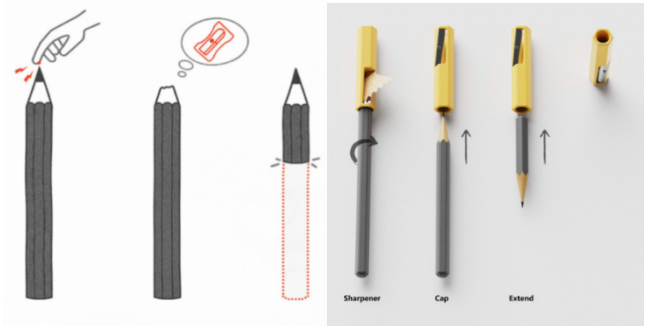


Figure 7. Sharpcap Pencil caps

5.8. Whether They Can be Reversed.

That is, if you think in opposite directions, can you switch positions up and down, left and right, front and back, inside

and outside, positive and negative? Are there any new discoveries or new functions after the replacement? For example, Samsung Electronics designed the recycling scheme of corrugated boxes. For packaging materials that would otherwise be thrown away, simply connect some points with a pencil and cut out the painted patterns. After just a few minutes of matching, a unique magazine rack, pet nest and other items can be made, realizing the perfect integration of sustainability and creative upgrading.



Figure 8. Samsung Electronics recycles corrugated boxes

5.9. Whether They can be Adjusted

That is to change the perspective of thinking about the problem, can we change the order, components, models, arrangements, etc.? What happens after the switch? For example, Tube Lock for Bicycle, which won the German Red Dot Supreme Award, is a new and convenient design of bicycle lock. It integrates the lock with the bicycle seat pole, breaking through the form limitation of traditional bicycle lock. Fingerprint unlocking eliminates the pressure of losing the lock key, making the bicycle a stylish and neat safety system. This design is the traditional sense of the bicycle and bike lock arrangement of another way, to bring more convenience to users.



Figure 9. Tube Lock for Bicycle

6. The Dialectical Unity of Quantity and Variable Makes Artistic Design More Vital

From the above analysis, it is not difficult to see that any artistic design should go through five stages: preliminary research, preliminary assumption, in-depth design, final improvement and negation. The research and preliminary conception stage is based on quantitative analysis, the in-depth design and final improvement stage is based on variable analysis, and the negation of negation stage is to re-examine the quantitative and variable. Explore the dialectical unity of the relationship between the two, in order to extend the vitality and inheritance of the design.

6.1. Calculate Variables in Quantitative Analysis

When receiving the target task, the preliminary research is mainly to find out what task? What purpose? What's the reason? Where do you do it from? Who will do it? What time do you do it? How do you do it? And a series of quantitative information, using the Osborne check list method to analyze this quantitative information, looking for whether there is any information that can be changed? How much can you change? And these information for the preliminary design link to meet the quantitative information on the basis of providing a broad thinking space.

6.2. Quantitative Calculation in Variable Analysis

On the basis of the preliminary assumption framework, it enters the in-depth design stage of careful verification. Through analysis, comparison, measurement and other methods, various assumed variables are brought into the quantitative to check whether they meet the quantitative requirements. Those that do not meet are abandoned, those that meet are retained, and the retained variables are further investigated which is the best value. That is to find a relatively constant quantity among the variables most suitable for quantitative requirements in order to achieve the final relatively perfect design results.

6.3. Re-examine Quantification and Variables

The final improvement of the task does not mean the end of the design, and the final negation stage is the stage of re-examining quantitative and variable, exploring the balance between quantitative and variable, because the pursuit of quantitative will make the work tend to mediocre, while the pursuit of variable will make the work tend to utopian, so correctly grasp the relationship between quantitative and variable unity of opposites. Only in this way can artistic design works meet the actual needs and make new breakthroughs, transform variable "innovation" into social value, and transform knowledge into productivity. It can be seen that the dialectical unity between quantitative and variable can break the shackles of thinking and become the driving force of innovation and social development.

7. Conclusion

Throughout the above analysis, it is not difficult to see that scientific statistical methods play a positive role in promoting artistic design. It enables any form of art design to quickly and accurately find the essence of problems and needs through complicated phenomena. Able to stand on high, clear the mind, simplify, draw scientific analysis conclusions; Be able to carry out variable innovation practice on the basis of quantitative demand by mastering and correctly controlling scientific methods such as index system, data selection and model construction; It can be used to measure whether the results of the integration of statistical science method and art design are perfect by centering on whether the practical results are practical, whether they are targeted, whether they can stand the test and whether they can solve problems. As practitioners in the field of art design, we need to correctly view scientific statistical methods, integrate scientific data analysis, rational research methods and profound problems into the whole process of art design, and design and develop more artistic design works full of vitality and inheritance.

References

[1] Mi Hong, Zhang Wenzhang, Practical Statistical Analysis Method and SPSS Application [M], Beijing: Contemporary China Press, 2004.

[2] Xiaoshan Zhang, Social Statistics and SPSS [M], Wuhan: Huazhong University of Science and Technology Press,2018 (2nd edition.

[3] Wang Shouzhi, History of Modern Design in the World [M], Beijing: China Youth Publishing House, 2002.

[4] Wang Shouzhi, History of Modern Architecture in the World [M], Beijing: China Architecture and Building Press, 1999.

[5] Li Leshan, Foundation of Industrial Design Thought [M], Beijing: China Architecture and Building Press, 2001.

[6] Zhang Zhan, Wang Hong, Product Improvement Design [M], Shanghai: Shanghai Literature and Art Publishing House, 2012.

[7] Wu Qiong, Industrial Design Skills and Taboos [M], Beijing: China Machine Press,2009.

[8] Wu Qiong, Zhang Yu, Sun Bo, Research on the Development and design Process of Cultural Derivative Products based on the Theory of Product System Design [J], Hundreds of Art, No.03, 2013,pp. 211-214.

[9] Junping Jia, Applied Statistics [M], Beijing: China Renmin University Press,2017.

[10] Eileen Magnello, Tang Hailong (trans.) [M], Beijing: Contemporary China Press, 2014.

[11] Wang Wenyu, Luo Dan. Application of Statistical Methods in User Research of Product Design [J], Art View, 03,2011, 126-127.