

The Application of Emotional Design in Bamboo Furniture

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Abstract

With the improvement of people's living standards, furniture is not only a simple practical tool, but also a medium for people to express their personality, emotions and aesthetic needs. As a green, environmentally friendly and sustainable home furnishing choice, bamboo furniture integrates emotional needs in innovative design, which can better meet the psychological needs of modern consumers. From the perspective of emotional needs, based on the three-level theory of emotional design, this paper will discuss and summarize the three-level expression carriers and forms of emotional design of bamboo furniture products, and select typical samples for case analysis, providing new ideas and practice paths for innovative design of bamboo furniture. In order to provide help for the development of bamboo furniture industry and provide consumers with better furniture use experience.

Keywords: Bamboo Furniture, Emotional Needs, Emotional Design, Innovative Design, Case Studies

Introduction

With the development of society and the progress of science and technology, people's life style and aesthetic concept have undergone great changes. As an essential item in People's Daily life, the design of furniture is no longer limited to simple practicality and functionality, but pays more attention to meeting people's emotional needs. As a green, environmentally friendly and sustainable home furnishing choice, bamboo furniture integrates emotional needs in innovative design, which can better meet the psychological needs of modern consumers and enhance the market competitiveness of products. The innovative design method of bamboo furniture based on the emotional needs of consumers is in urgent need of improvement. This paper focuses on the three-level theory of emotional design and explores a set of innovative design and expression method of bamboo furniture based on the three-level emotional design.

The Importance of Emotional Needs in the Innovative Design of Bamboo Furniture*Satisfaction of Individual Needs*

With the change of consumption concept, people are pursuing more personalized and differentiated products (Sun,2022). The integration of emotional needs into the innovative design of bamboo furniture can meet consumers' pursuit of personalized needs, and make furniture become a carrier to show personal taste and style.

Generation of Emotional Resonance

Emotional resonance means that the product can trigger the emotional resonance of consumers and create an emotional connection between consumers and the product (Yang,2023). By incorporating emotional elements into the design of bamboo furniture, it can trigger the emotional resonance of consumers and enhance the attractiveness and loyalty of products.

Improvement of User Experience

Good user experience is the key to the success of product design (Li et al.,2019). By focusing on the emotional needs of consumers and optimizing the details and interaction ways of products, the user experience can be improved, so that consumers have a better impression and evaluation of the product.

Increase of Product Market Share

Through emotional design, make bamboo furniture more attractive and competitive, so as to get more consumers' favor, bamboo furniture products sales will be improved, so as to increase its market share, but also for bamboo furniture related industries and practitioners to increase income, and thus improve the development of green furniture.

Current Status of the Application of Emotional Needs in the Innovative Design of Bamboo Furniture

In the innovative design of bamboo furniture, it is key to fully understand and meet the emotional needs of users, which can be achieved through various methods such as Kansei engineering, big data analysis, deep convolutional neural network, deep convolutional generative adversarial network, emotion analysis and emotion modeling.

For example, Xue et al.(2022), this research combines design thinking (DT) with Kansei Engineering (KE) to conduct user-centered product design. The KE-DT framework is proposed to enable designers to coordinate the user's feelings as a design element. The designed bamboo pen holder products are more in line with the needs of users. Sun & Shao(2021) studied and obtained the future development trend and user portrait of bamboo furniture by using the user big data analysis method. The research shows that bamboo chairs lack a sense of design at present, and bamboo furniture can be improved to expand the consumer group. At the same time, it is also necessary to consider the characteristics of bamboo itself, in order to design bamboo furniture products that are more suitable for users' needs. Li & Zhang(2019) analyzed the application of four kinds of material processing characteristics in furniture design, and finally verified that mastering material processing characteristics is the premise and guarantee for achieving the ideal effect of furniture product modeling, and provided a reference for furniture design using material processing characteristics.

Kang et al. (2023) mainly studied the application of deep convolutional neural networks and deep convolutional generative adversarial networks in the emotionally driven design of furniture innovation. In this paper, the author discusses how to use these techniques in furniture design to meet the emotional needs of users. Specifically, the use of deep convolutional neural networks to analyze users' emotional feedback is discussed and applied to furniture design. In addition, the authors introduce the use of deep convolutional generative adversarial networks to generate furniture design solutions with emotional characteristics. Through the use of these technologies, an emotion-driven furniture innovation design method is proposed to better meet the individual needs of users.

Sun & Shao(2021), The main research content is about the application of emotional needs in furniture innovation design. The authors discuss how to use emotional needs to guide furniture design to meet the emotional needs of users. Specifically, the authors introduce the use of sentiment analysis and sentiment modeling to understand the emotional needs of users and apply it to the furniture design process. An innovative furniture design method based on emotional needs is also proposed, which combines user's emotional feedback with emotional modeling to design furniture products more in line with user's individual needs. Through this method, the authors propose an emotion-driven furniture innovation design method to provide users with better furniture experience.

To sum up, the innovative design of emotional needs in bamboo furniture should not only grasp the emotional needs of customers in a reasonable way, and match the emotional needs of customers with the design elements of bamboo furniture, but also fully consider the characteristics of bamboo itself, give play to the advantages of bamboo itself, and bring special emotional images based on bamboo to consumers.

Emotional Design Expression Carrier and Expression form of Bamboo Furniture

Emotional Design three Levels's Expression Carrier of Bamboo Furniture

In the emotional design of products, the concept of "Emotional Design" proposed by Professor Donald Norman, a famous American cognitive psychologist, is commonly used (Gao,2023). In his book *Design Psychology*, this concept deeply discusses the emotional design system from the three levels of instinct, behavior and reflection (Yan,2023).Instinct, behavior and reflection are the three operating levels of the brain. The first level in the three-level theory is the "Instinct Level", which brings intuitive feelings of color, shape and other product appearance to the naked eye. The second level is the "Behavioral Level", which uses actions such as touching to interact with the product in order to stimulate the brain's behavior patterns. The third level is the "Reflective Level", where the brain generalizes and reuses the information it has processed. A product contains all three levels, there is no independent level, each level reflects different degrees of emotion, the human brain also feels different emotions. Through the three-level theory of emotional design, the emotional expression carrier and form of bamboo furniture are interpreted, and the corresponding relationship diagram shown in Figure 1 is obtained.

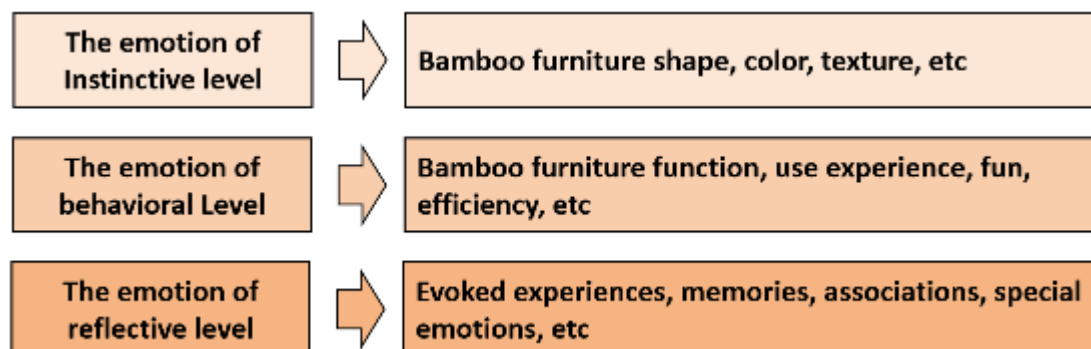


Figure 1 The emotional expression carrier of bamboo furniture

Emotional Design Three Levels's Expression form of Bamboo Furniture

The Emotional Expression of Bamboo Furniture Products in the Instinctive Level

(1) Material and emotion expression. As a natural material, bamboo has a unique texture and beauty. By choosing the appropriate bamboo material and treatment method, the natural beauty of bamboo can be highlighted, so that consumers can feel a natural, fresh and comfortable emotional experience. At the same time, bamboo texture, color and other characteristics can also become important elements of emotional expression.

(2) Transmission of color and emotion. Color is one of the important factors that affect people's emotions. Different colors can convey different emotions and atmospheres. In the innovative design of bamboo furniture, the reasonable use of color elements can create a warm, comfortable, vitality and other different emotional atmosphere to meet the different emotional needs of consumers. For example, warm colors can create a warm family atmosphere, while fresh colors can give people a relaxed and pleasant feeling.

(3) The embodiment of shape and emotion. Modeling is one of the important elements in furniture design. Through the use of simple and smooth lines, unique structure, creative details and other techniques, you can integrate emotion into the furniture modeling. For example, a streamlined shape can give people a soft and elegant feeling, while a square shape can convey a stable and dignified emotion. At the same time, reasonable size and proportion can also enhance the emotional expression effect of the product.

The Emotional Expression of Bamboo Furniture Products at the Behavioral Level

(1) Use of functional and emotional communication. Compared with other materials, bamboo has its unique characteristics and advantages, and the characteristics of bamboo should be given full play in the functional innovation design of bamboo furniture. Bamboo has very good toughness, high tensile strength, high compressive strength, and good splitting ability (Mao,2006). For example, the good mechanical properties and toughness of bamboo can be made into a bamboo chair or sofa with good elasticity. Through the design of structure and shape, users can experience a very good sitting and relying experience. For example, to play the bamboo is very good splitting, made into bamboo, bamboo and other materials, to make the lampshade of bamboo lamps, so that it gets a very warm and soft lighting effect, or so that consumers experience special light and shadow effects.

(2) Interactive experience and emotional communication. With the development of science and technology and the change of people's lifestyle, the interactive experience of furniture has become one of the key concerns of consumers (Gu & zhu,2017). In the innovative design of bamboo furniture, intelligent sensing, voice recognition and other technologies can be added to achieve interactive communication with consumers. For example, the Angle and height of the seat can be automatically adjusted according to the behavior and habits of consumers; Or through voice control to achieve lighting adjustment, music playback and other functions. These interactive experiences can enhance the interaction and experience of the product, so that consumers feel more intimate and convenient service in the process of use. At the same time, the design of interactive experience can also enable consumers to establish a closer emotional connection with the product, and improve product loyalty and word-of-mouth effect.

The Emotional Expression of Bamboo Furniture Products in the Reflective Level

(1) Integration of culture and emotion. As a carrier of culture, furniture can convey specific cultural connotations and values. In the innovative design of bamboo furniture, we can learn from traditional cultural elements and combine modern design techniques to create works with cultural heritage and emotional connotation. For example, the use of traditional patterns or symbols for innovative design can convey a unique cultural flavor and values, and trigger emotional resonance among consumers.

(2) The identification of the concept and emotion of sustainable development. Sustainable development has become one of the important issues in today's society (Sun,2023). In the innovative design of bamboo furniture, actively promoting the concept of green environmental protection and sustainable development can make consumers have a deeper emotional identification with the product. For example, it emphasizes the environmental advantages of bamboo as a fast-growing, renewable plant; Or use environmentally friendly materials and technologies in the design process to reduce energy consumption and waste emissions. These sustainable development concepts and practices can make consumers have a more positive emotional experience in the process of using products, and improve the market competitiveness of products.

Case Studies

Select a representative bamboo product case, carry on in-depth analysis, analyze the three levels of emotional design in the case of the specific application.

Case Analysis of the Application of Emotional Design in the Instinctive Level

Figure 2 Master chair of Seven sages in bamboo forest, source: Suo's Bamboo Industry

This chair (Figure 2) is from the master chair of the Seven Sages of the Bamboo Forest series under the Chinese Suo's Bamboo Industry. At the instinctive level of emotional design, the chair brings a very different emotional image to people with its unique material, color and shape. The main body and frame structure of the chair are made of original bamboo, of which the frame structure is mainly made of dragon bamboo (Latin scientific name: *Dendrocalamus giganteus* Wall. ex Munro), and the center decoration of the back and the bottom of the chair are connected by bamboo (Latin scientific name: *Chimonobambusa tumidissinoda* J. R. Xue & T. P. Yi), the chair is made of soft drawers made of bamboo. The main frame is made of Longzhu round bamboo, which has symmetrical appearance and small diameter change. The chair connection is mainly right-angle connection, and the form elements are composed of lines and planes, which gives people a tough feeling and reflects the cultural connotation of bamboo. At the same time, the four vertical main chair legs are also slightly curved, more straight and strong. The central position of the backrest vision and the bottom of the chair are connected by the round bamboo, the bamboo joints are deformed and beautiful, and the bamboo is resistant to insects and rot, which is the best raw material for making furniture, walking sticks, daily necessities, high-grade crafts and ornaments. In the production process, the bamboo ring with unique characteristics and the big bone node of the natural uplift are specially retained, which is like two discs interconnecting up and down, which is beautiful and agile; There is also a slight arc between the bamboo joints, making the details durable and varied (see Figure 3). The chair seat surface made of bamboo weaving, the traditional bamboo weaving style of regular arrangement and combination, brings a strong sense of order, and the traditional elements of bamboo weaving enhance the style characteristics of the chair. In terms of material texture and color, the round bamboo used after carbonization, polishing, coloring, doing old, surface painting and other process steps, showing a deep brownish red, giving people a simple and elegant feeling, while the bamboo seat surface is lighter than the color, using the original brownish yellow bamboo, giving people a warm and close feeling. At the same time, the combination of two color shades forms a contrast, enriches the sense of visual hierarchy, and gives people more visual perceptual images.



Figure 3 The detail display of master chair of Seven sages in bamboo forest, source: Suo's Bamboo Industry

Case Analysis of the Application of Emotional Design in the Behavioral Level

Take the SEAT bamboo stool series from the School of Art and Design of Guangdong University of Technology as an example (Figure 4). The design of the three bamboo-woven SEAT stool of SEAT bamboo is based on exploring the plasticity of the random weaving process of bamboo strips. By combining the random weaving process with the stool surface, the process material characteristics of high tensile strength and strong shaping force of random weaving can be displayed in three ways that meet the shape of man-machine curved surface. The process and function complement each other, and fully show the organic sense and flexibility of the woven form of the chaotic knitting process; After the user sits up, because the bamboo design of the bench has good elasticity and toughness, it has a very comfortable feeling compared with other stools, which is very ergonomic and has a different sense of experience. The designer named the three benches "boat", "saddle" and "hill" respectively through the shape semantics. The legs of the wooden stool are connected with the stool surface by mortise and tenon. The combination of bamboo and wood can also bring people a natural sense of harmony, and the integration with the home environment is good.



Figure 4 SEAT bamboo, source: School of Art and Design, Guangdong University of Technology

Case Analysis of the Application of Emotional design in the Reflection Level

Figure 5 "voice lifting" bamboo weaving bluetooth speaker,
source: <https://www.sj51.net/22182.html>

Take "voice lifting" bamboo weaving bluetooth speaker(see Figure 5) as an example. The surface decoration is made of bamboo weaving, the overall shape elements are derived from ancient Chinese boxes, the main part is combined with crabapple elements, and the surface material of the lower part is made of bamboo weaving, forming the overall shape as shown in Figure 5. Thus, in the process of using the product, it brings more associations and emotional resonance. Or it may be reminiscent of the clever use of traditional Chinese box modeling; Or let one's mind be attracted by the beautiful shape of the begonia element. At night, the Bluetooth speaker can also be used as a night light, and the effect of the light presented through the bamboo knitting appears soft and warm, which is very in line with the functional requirements of the night light; At the same time, the effect of bamboo weaving is like sunset dusk, and the crisscrossing bamboo weaving silhouettes bring rich reverie to the picture.

Conclusion

With the improvement of people's living standards and aesthetic concepts, the demand for furniture is no longer satisfied with simple practicality or aesthetics. More and more consumers begin to pay attention to the emotional value and cultural connotation conveyed by furniture. Therefore, the innovative design of bamboo furniture should take emotional needs as one of the important considerations in order to meet the psychological needs of modern consumers and improve the added value of products. Through the expression and practice of material, color, shape, use experience and culture, it is one of the trends of bamboo furniture design in the future to integrate emotion into products. At the same time, with the development of science and technology and the importance of sustainable development has become increasingly prominent, the concept of sustainable development has become more and more important in the innovative design of bamboo furniture, by emphasizing environmental protection and renewable characteristics of bamboo furniture can better meet the consumer's pursuit of green life.

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