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# *Exploration on Fashion Design of Environmental Protection Fabric under the Cross-species Concept*

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***Abstract:*** With the fashion industry paying attention to sustainable development, it is of great significance to study the design of the combination of cross-species concept and environmentally friendly fabrics. This article focuses on the application of environmental protection fabrics in fashion design under the concept of cross-species. By analyzing the related theories of cross-species concept and environmental protection fabric, it is clear that cross-species concept originates from the reflection on traditional anthropocentrism and environmental protection fabric is based on the principle of sustainable development. By using the methods of literature research and case analysis, this article discusses the principles and methods of its application in fashion design, such as following the principles of eco-friendliness, functionality and aesthetics, adopting bionic design, innovative combination of materials and cultural integration. This combination brings innovative opportunities for fashion design, and shows a unique innovative practice direction in style, structure and decoration. The integration of cross-species concept and environmental protection fabrics can promote the development of fashion design towards more innovation and sustainability, and provide useful reference for the transformation of fashion industry.

## 1. Introduction

In today's era, the sustainable development of fashion industry has become the focus of global attention. With the increasing awareness of environmental protection, how to meet the aesthetic needs and realize the protection and respect for the ecological environment has become a key issue to be solved urgently for fashion design [1]. In this context, the application of cross-species concept and environmental protection fabrics in fashion design is gradually showing its unique value and far-reaching significance [2]. Cross-species concept, as a new design thinking mode, breaks the limitations of traditional anthropocentrism, and emphasizes examining and understanding various phenomena and laws in nature from the perspective of different species, and integrating them into design creation [3]. The core of this concept is to advocate the harmonious symbiosis between man and nature and different species, and to pursue a design innovation that transcends species boundaries [4]. From the biological point of view, every species on the earth has developed a unique form, structure and function that adapts to its living environment in the long process of evolution. These natural "design wisdom" provide endless inspiration for fashion design.

As an important material basis of sustainable fashion, environmentally friendly fabrics have also been widely concerned and applied in recent years [5]. The category of environmentally friendly fabrics covers many types. Natural fiber fabrics reduce the use of chemical pesticides and fertilizers in the planting process, and reduce the pollution to soil and water sources. Recycled fiber fabrics realize the recycling of resources and reduce the dependence on original resources by recycling waste plastic bottles [6]. Bio-based fabrics, such as fabrics made from biopolymers produced by microbial fermentation, are biodegradable and can naturally return to the ecosystem after the end of their life cycle, reducing the pressure on the environment.

The application of cross-species concept and environmental protection fabric in fashion design is not only a breakthrough and innovation of traditional design concept, but also an inevitable choice to conform to the development trend of the times and meet environmental challenges [7]. This combination urges designers to think more deeply about the relationship between man and nature, draw inspiration from nature with a more humble and respectful attitude, and give full play to the characteristics of environmentally friendly fabrics to create fashion works that are both in line with modern aesthetics and eco-friendly.

At present, the research and practice in this field is still in the development stage. Although some designers have made relevant attempts, on the whole, the systematic application research of cross-species concept in fashion design of environmentally friendly fabrics is still insufficient [8]. The purpose of this article is to deeply analyze the connotation and characteristics of cross-species concept and environmental protection fabric, and to explore the application principle and innovative practice direction of the combination of the two in fashion design.

## 2. Theoretical analysis of cross-species concept and environmental protection fabrics

Cross-species concept originates from the reflection of traditional anthropocentrism, and its core lies in breaking species boundaries, advocating equal symbiosis of all species, and drawing design inspiration from cross-species perspective. This concept is deeply influenced by ecological holism in philosophy, emphasizing that all creatures in nature are interdependent and human beings are only a part of the ecosystem. From a cultural point of view, different national cultures have elements of respect and reference for other species. Cross-species concept integrates these cultural connotations into design and enriches design thinking [9]. In the field of design, the concept of cross-species inspires designers to get inspiration from the shape, structure and function of non-human species.

The theoretical basis of environmentally friendly fabrics is based on the principle of sustainable development. From the perspective of resources, it emphasizes the protection and rational utilization of limited natural resources, such as organic cotton planting to reduce the consumption of land fertility and ensure the sustainable supply of cotton resources [10]. From the perspective of environmental impact, the production process of environmentally friendly fabrics pays attention to reducing pollution emissions, such as Tencel fiber production using closed-loop technology to reduce chemical waste emissions. From the perspective of ecological balance, biodegradable fabrics can be decomposed in the natural environment to avoid long-term accumulation and ecological damage. There are many kinds of environmentally friendly fabrics, each with its own characteristics. Natural environment-friendly fabrics, such as flax, are famous for their good air permeability and hygroscopicity, and the planting process consumes less water and is environmentally friendly. Recycled fabrics, such as recycled nylon, are recycled by using discarded fishing nets and other materials to realize resource recycling and reduce dependence on primary resources. With the help of biotechnology, the new bio-based fabric is made of microbial fermentation products, which has unique properties and ecological advantages.

## 3. The application principle and method of cross-species concept in fashion design of environmental protection fabrics

Cross-species concept has opened up a new path for fashion design of environmentally-friendly fabrics. In practice, it is necessary to follow a series of application principles and adopt effective methods to achieve unique and sustainable design goals.

### 3.1 Application principle

①Eco-friendly principle: This is the cornerstone of fashion design of environmentally-friendly fabrics under the cross-species concept. Designers should give priority to the use of environmentally friendly fabrics with little impact on the environment, such as organic cotton and bamboo fiber.

②Functionality principle: Learning from cross-species characteristics is not only for unique appearance, but also for enhancing the functionality of fashion. For example, it imitates the hollow and warm structure of polar bear hair and applies it to the design of winter clothing fabrics to enhance the warm-keeping performance.

③Aesthetic principle: Aesthetic expression should be paid attention to when cross-species elements are integrated into design. Elements such as shape, color and texture extracted from natural species need to be skillfully conceived and designed to be transformed into fashion language that conforms to human aesthetics. We should not only keep the unique charm of nature, but also conform to the contemporary fashion trend and create beautiful and artistic works.

### 3.2 Application method

Figure 1 Butterfly wing fashion bionic show

①Bionic design method: This is an important method for the application of cross-species concept. Imitation and innovation are carried out by observing and studying the characteristics of biological morphology, structure and function. For example, imitating the microstructure of

butterfly wings, using special printing and dyeing or weaving technology, the fabric presents a gorgeous color change effect. The application of bionic design of butterfly wings in fashion fabrics is shown in Figure 1 and Table 1 respectively:

Table 1 Specific analysis of bionic design of butterfly wings in different aspects

| Mimicry Element | Specific Manifestation | Implementation Method | Impact on Fashion Effect | Applicable Clothing Types | Fabric Selection | Potential Audience |
|---|---|---|---|---|---|---|
| Wing Color Structure | Iridescent colors that change with angle and light | Apply optical coatings to the fabric or weave multiple layers | Strong visual appeal, presenting fantastical colors | Evening gowns, stage costumes | Lightweight, transparent, and eco-friendly silk-like materials | Those who seek unique attire for special occasions |
| Scale Arrangement | Ordered and layered appearance | Embroider or 3D print imitation scales | Enhance fabric texture and three-dimensionality | High-end bespoke clothing, art exhibition attire | Slightly stiff eco-friendly blended fabrics | High-end and art-oriented individuals |
| Wing Texture | Natural and flowing lines | Digital printing or laser-cut textures | Create a natural ambiance and add a sense of agility | Daily dresses, tops | Soft and skin-friendly eco-friendly knitted fabrics | Daily natural style enthusiasts |

Figure 2 The embodiment of cross-species concept at the cultural level

②Innovative combination method of materials: Innovative combination of different types of environmentally-friendly fabrics to give full play to their respective advantages. For example, soft

and breathable organic cotton is combined with elastic regenerated spandex to make comfortable clothes that fit the body curve. In the process of combination, we should consider the compatibility and overall effect between fabrics to ensure the quality and style of clothing.

③Cultural integration method: Many species have unique symbolic meanings in different cultures, and these cultural connotations are integrated into the design. In China culture, plum blossom symbolizes tenacity and nobleness. The shape, color or related cultural patterns of plum blossom can be integrated into environmentally-friendly fabric fashion through embroidery, printing and dyeing, which endows clothing with cultural heritage. The cross-species concept is embodied in the cultural level, as shown in Figure 2.

## 4. Innovative practice direction of environmental protection fabric fashion design under cross-species concept

The integration of cross-species concept and environmental protection fabrics has brought unprecedented innovation opportunities for fashion design. In terms of style innovation, it breaks the boundaries of traditional fashion styles and creates a unique visual and wearing experience. Table 2 lists this kind of style innovation practice in detail:

Table 2 Style innovation based on cross-species concept

| Inspirational Species | Corresponding Eco-Friendly Fabric | Style Characteristics | Design Details | Color Palette | Suitable Occasions |
|---|---|---|---|---|---|
| Polar Bear | Imitation fur regenerated fabric | Simple and warm, exuding natural simplicity | Loose fit, frayed edges at the neckline and cuffs | Mainly white and gray, with black outlines | Winter outdoor activities, daily warmth |
| Chameleon | Color-changing eco-friendly fabric | Fantastical and versatile, with a sense of technology | Slim fit, dynamic color-changing patterns | Changes with the environment, different indoors and outdoors | Fashion shows, tech events |
| Dolphin | Lightweight and quick-drying eco-friendly polyester fiber | Agile and elegant, with oceanic vitality | Streamlined cuts, wavy necklines and cuffs, with fin-like decorations | Gradient blue hues with white accents | Seaside vacations, water sports |

Structural innovation is another important direction. Imitating the segmented and flexible structure of insect exoskeleton, the movable splicing design is adopted at the joints of clothing to enhance the wearing comfort and mobility convenience of clothing. Decoration innovation is equally brilliant. Drawing lessons from the shape and color of flowers, we embroider realistic flower patterns with environmentally-friendly silk thread, and embellish them on necklines, cuffs or skirts. Based on the texture of insect wings, exquisite lace is made and decorated on the edge of clothing. In the choice of decorative materials, adhering to the concept of environmental protection, using natural shells, fruit stones and so on to make buttons or accessories is both environmentally friendly and unique.

The fashion design of environmentally friendly fabrics under the cross-species concept can also be deeply integrated with science and technology. With the help of intelligent materials, the intelligence of clothing functions is realized. For example, develop environmentally-friendly fabrics that are sensitive to temperature and humidity. When the external environment changes, the fabric automatically adjusts its air permeability or warmth retention, just like the biological adjustment

mechanism itself. Using 3D printing technology, three-dimensional decorations imitating biological forms, such as butterfly wings and antlers, are accurately created, adding a unique futuristic sense and technological charm to fashion. Through these innovative practice directions, the fashion design of environmentally-friendly fabrics under the cross-species concept can not only meet consumers' dual pursuit of fashion and environmental protection, but also promote the fashion industry to move forward in an innovative and sustainable direction.

## 5. Conclusions

This article explores the fashion design of environmental protection fabrics under the cross-species concept, and reveals the rich connotation and development potential of this innovative design path. Cross-species concept breaks the limitations of traditional design and draws inspiration from different species from a unique perspective, while environmentally friendly fabrics lay a material foundation for sustainable design. The combination of the two in fashion design follows the principles of eco-friendliness, functionality and aesthetics, and realizes multi-dimensional innovation by using bionic design, material innovation combination and cultural integration.

In terms of style, it breaks through the traditional boundaries and simulates biological characteristics to create a unique style such as agility and primitiveness. In terms of structure, learn from the optimal design of biological body structure to enhance comfort and sense of modeling. In decoration, inspired by cross-species elements, environmental protection materials and various crafts are adopted to enhance artistic appeal. At the same time, it is deeply integrated with science and technology, and with the help of smart materials and 3D printing, it gives fashion intelligence and futurity.

At present, the development of this field still faces some challenges, such as the practical application of some cross-species design concepts is difficult, and the balance between the performance and cost of environmentally friendly fabrics needs to be optimized. In the future, it is necessary to further strengthen interdisciplinary research, promote the cooperation between designers, biologists and materials scientists, deeply tap the potential of cross-species concept, improve the performance of environmentally friendly fabrics and reduce costs. Under the cross-species concept, the fashion design of environmentally-friendly fabrics is expected to lead the fashion industry to a more sustainable and innovative development path, and make greater contributions to protecting the ecological environment and meeting human aesthetic needs.

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