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CULTURAL GENES IN FASHION DESIGN: MAPPING TRADITIONAL PATTERNS TO CONTEMPORARY DIGITAL DESIGN

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Based on the theory of cultural genes, this study explores the inheritance and variation of traditional "snake patterns" in fashion design. At the same time, it introduces the cross-perspectives of digital fashion, digital art, and typology. It analyses the snake pattern elements in different cultural backgrounds as a basis for exploring how to reconstruct cultural symbols and innovate fashion through digital means.

Key words: *fashion design, digital fashion, traditional pattern, cultural heritage.*

INTRODUCTION

Cultural genes refer to relatively stable and variable symbolic elements in a specific cultural environment. They play an important role in inheriting and reconstructing traditional and modern design fields. In recent years, with the continuous penetration of digital technology and artificial intelligence in the fashion industry and artistic creation, how to preserve and innovate cultural genes through digital means has become one of the hot topics in the cross-study of design and art. As a typical decoration and cultural symbol in various civilization systems, snake patterns have cross-cultural and cross-era ductility. Digital reconstruction of them can present richer visual expression and expand the application value of traditional cultural genes in contemporary fashion and art. In this context, digital art provides a new platform for the interactive presentation and innovative reconstruction of traditional patterns. The typological research method further helps us compare and sort out the forms, meanings, and functions of snake patterns in different cultural backgrounds to reveal the diverse values contained in them as cultural genes more systematically.

PURPOSE

Systematically sort out the symbolic significance of snake patterns in different cultures and their expressions; Analyze how the rise of digital fashion and digital art provides a new path for the inheritance and innovation of traditional cultural genes; Explore the inheritance and variability of snake motifs in cross-cultural environments and their expression strategies in digital scenarios through a typological perspective.

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RESULTS AND DISCUSSION

In textile design, Kim [1] examines surrealist expressions in digital textile printing. Beyond direct fashion applications, the literature on traditional patterns in traditional culture and fashion design is researched. On this basis, combined with cultural gene theory by Zhao Haiying [2] and typological methods, patterns in different regions and historical periods are classified and compared across cultures. This aligns with Uchiyama, Spicer, and Muthukrishna [3], who introduce a genetic plasticity framework based on cultural evolution, analyzing the dynamic interactions between cultural inheritance and adaptation. A systematic review of scientific research in the field of digital fashion is presented in the article by Yezhova et al. [4].

Snake motifs exhibit morphological diversity tied to cultural symbolism: Chinese and Japanese traditions employ angular geometries (rhombuses, hexagons) to mimic scales, while Hellenistic Egyptian and Baule designs favour fluid spirals and curves, evoking cyclicality. Native American patterns blend both, using stripes and triangles to represent natural rhythms abstractly.

Symbolically, snakes universally signify protection and vitality but diverge in emphasis: China links them to cosmic wisdom, Japan to wealth, Hellenistic Egypt to fertility, Baule to ancestral continuity, and Native cultures to ecological spirituality. By deconstructing traditional forms into modular digital elements — rhombic grids, fractal spirals — designers could preserve cultural essence while enabling transcultural innovation. As adaptive archetypes, snake motifs bridge heritage and algorithmic design, offering a universal visual language for techno-cultural storytelling in fashion.

Asclepius, the Greek God of medicine, is depicted with a rod entwined by a snake, symbolizing healing, wisdom, and resurrection. The Italian jewelry brand Bulgari's Serpenti collection, steeped in myth, has captivated audiences worldwide for centuries. In 2021, Bvlgari and digital artist Refik Anadol jointly created it in Italy, presenting the theme of "Snake Transformation" through artificial intelligence (AI) and interactive technology (Fig 1). The designer used algorithmic generative art (based on GAN or big data processing), digital smell (using sensors and odor molecule control systems), multimedia interactive devices and other technical means to create the exhibition installation design (Fig 2), innovatively expressed the concept of metamorphosis through an immersive AI data sculpture.

Fig. 1 Serpenti metamorphosis
(Refik Anadol, 2021, Italy)

Fig. 2 Immersive Serpenti world.
(Refik Anadol, 2021, Italy)

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The feedback and immersion of the audience on the digital art installation, especially focused on the digital reconstruction and cultural transmission of the snake pattern element at the visual and sensory levels. The combination of Bulgari's brand symbol and snake pattern in the context of Italian literature and art demonstrates the cross-border integration of fashion luxury goods, traditional cultural genes and cutting-edge digital art.

CONCLUSIONS

The inspiration for digital fashion and digital art is multidisciplinary integration: combining typology, cultural gene theory and digital art practice can dig deeper and convey the intrinsic value of traditional patterns. The Bvlgari fashion exhibition case in Italy combines art installations, algorithm technology, odor perception and traditional Italian design aesthetics, vividly interpreting the immersive experience of snake pattern elements in the new era and providing a practical case for studying the integration of digital art and traditional cultural genes. Digital fashion should make use of sensory technologies to further amplify the depth of experience of traditional cultural elements. Through cross-border cooperation, luxury brands and artists can jointly explore cultural innovation in the digital era, realizing a win-win situation between cultural genes and commercial fashion.

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У Сіміао, ЄЖОВА О.
КУЛЬТУРНІ ГЕНИ В ДИЗАЙНІ ОДЯГУ: ВПРОВАДЖЕННЯ ТРАДИЦІЙНИХ МОДЕЛЕЙ В СУЧАСНИЙ ЦИФРОВИЙ ДИЗАЙН

Базуючись на теорії культурних генів, в роботі досліджено еволюцію та варіації традиційних «зміїних візерунків» у дизайні одягу. Водночас представлено можливість використання результатів в царині цифрової моди, та цифрового мистецтва. Проаналізовано елементи змійного візерунка в різних культурах як основу для дослідження того, як імплементувати культурні символи в сучасну моду за допомогою цифрових засобів.

Ключові слова: дизайн одягу, цифрова мода, традиційний візерунок, культурна спадщина.