

# Analysis of the Application of Dunhuang Pattern Elements in Sustainable Design

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**Abstract:** *Dunhuang patterns are an important component of Dunhuang grotto art. Dunhuang patterns are decorated on murals, statues, grotto bodies, and wooden eaves, with exquisite craftsmanship, rich shapes, huge scale, unique layout, and precious artistic value. The character shapes, line sketches, and coloring of Dunhuang patterns express people's desire for beauty and goodness. Through analysis and research on the inheritance and evolution of artistic styles in different periods of Dunhuang patterns, the use of sustainable design concepts for creative transformation and innovative design not only enhances the influence and appeal of excellent traditional Chinese culture represented by Dunhuang culture, but also reveals the cultural spirit contained in Dunhuang patterns. This article explores the application of Dunhuang pattern elements in sustainable design.*

**Keywords:** Dunhuang patterns; Sustainable design; Visual communication; Application.

## 1. INTRODUCTION

The Mogao Grottoes of Dunhuang is a world cultural heritage and the largest existing treasure house of Buddhist art with a long history and rich content in the world. It is located at the west end of Hexi Corridor, commonly known as the Thousand Buddha Cave. While inheriting and developing the traditional arts of the Han and Jin Dynasties, the form of Dunhuang grotto art has also constantly absorbed the artistic styles of the Northern and Southern dynasties and the Tang and Song Dynasties, and formed a diversified and integrated Dunhuang art by constantly integrating the art and culture of India, Central Asia, and West Asia. Now, from the perspective of sustainable design, Dunhuang pattern elements are widely used in many aspects of contemporary art. The spiritual core of Dunhuang culture is integration and absorption, which is the cultural embodiment of "beauty and common" and "harmonious coexistence". This is also the view of harmonious development of people and environment required in sustainable design. In the development trend of integrating traditional Elements of art with modern visual design, The Dunhuang culture of "diversity and unity" is in line with it. Through Visual communication, we can refine Dunhuang pattern elements, which can meet the aesthetic needs of contemporary people and give consideration to the perspective of sustainable development of future generations. Dunhuang culture is constantly endowed with the connotation of the times, which is where the charm and vitality of Dunhuang culture under sustainable design lie.

## 2. BASIC CHARACTERISTICS OF DUNHUANG PATTERN ELEMENTS

Ancient craftsmen used exquisite techniques to depict a large number and a wide variety of murals in Dunhuang grottoes. According to the decorative effects of different dimensions of the grottoes, their patterns were mainly concentrated on caissons, herringbone draperies, and niche lintels. The patterns of edge decorations, round lights, clothing, furniture, carpets, and utensils in the murals were also important elements that formed the Dunhuang pattern system.

### 2.1 Edge Decoration Pattern Features

Edge decoration pattern is one of the Urelement that constitute the Dunhuang pattern. It is widely distributed in the murals in the grottoes. The role of edge decoration pattern is to separate the mural themes, and it changes constantly with the decorative functions of different regions and the evolution of artistic styles in different periods of history, and also integrates into a natural decorative effect in the change. During the Northern Dynasty (Northern Liang, Northern Wei, Western Wei, Northern Zhou), the Dunhuang border decoration patterns were concise and distinct, with honeysuckle patterns, cloud patterns, geometric patterns (square pattern, oblique pattern, diamond pattern), and concave convex platform patterns as the main patterns. The most common honeysuckle patterns were in various forms, such as single leaf wavy patterns, double leaf branching patterns, and four leaf interlocking patterns. On the basis of inheriting the patterns from Dunhuang during the Northern Dynasty, the most distinctive

Sui Dynasty pattern was the border decoration pattern with the joint bead pattern introduced from Persia to Dunhuang through the Western Regions. The edge decoration patterns of the Tang Dynasty were mainly composed of several styles, such as wavy continuity, scattered continuity, geometric continuity, and stacked scale continuity. The main patterns of this period were also round flowers and rolling grass, and geometric and small patterns. In the processing of patterns, color exchange was used to express the rhythm and rhythm of the patterns, making the Dunhuang decorative art of the Tang Dynasty reach its peak.

## **2.2 Characteristics of the herringbone cape pattern**

The herringbone drapery pattern is a unique category in Dunhuang decorative patterns. In the early stages of Dunhuang and the Sui Dynasty, some grottoes imitated the traditional wooden structure of the herringbone canopy structure, and widened the distance between the two draperies. The herringbone canopy was modified into a dome form, and ancient craftsmen enhanced the overall visual beauty of Dunhuang grottoes by composing and decorating patterns on this special ceiling. During the Northern Wei Dynasty, the design of the herringbone drapery was simple and rough, with images such as flying sky, offering Bodhisattvas, incarnating children, and auspicious animals combined with dynamic honeysuckle leaf patterns, lotus flower patterns, and undulating vine patterns. The herringbone drapery pattern decoration was freely spread, with a smooth and rhythmic density. The rafters and watchboards of the herringbone drapery roof structure were divided into spatial levels by a brightness ratio of brown red and beige white. The changes in color and the herringbone pattern complement each other, achieving a unified decorative artistic effect as a whole. From the Northern Wei Dynasty until the Sui Dynasty, there were also a series of changes in the design of the herringbone cloak. Patterns such as honeysuckle patterns and lotus patterns gradually changed from simple and extensive to complex and delicate, and the overall color became elegant and simple. The use of halo dyeing techniques increased the color variation of the patterns, and the floating convex wall clay sculptures that appeared on the top of the herringbone cloak in early grottoes were also replaced by flat drawn patterns. The decorative patterns of the herringbone drapery pattern also added patterns such as religious magic tools. Once, the flexible continuous wave pattern on the rafters gradually changed into a suitable pattern in the form of symmetrical rectangle. Until the Sui Dynasty, the center of the top of Dunhuang Grottoes was a square deep sunk caisson, and the shape was changed into a bucket shaped cave. The previous herringbone drapery pattern was also completely changed into a narrative picture of Buddhist stories, replacing the decorative pattern of the herringbone drapery.

## **2.3 Characteristics of circular light pattern**

Before the introduction of Buddhist culture to China, early religions originating in the Mediterranean region used circular patterns behind their heads to represent the wisdom and spiritual light of gods. These patterns were later introduced into China through Buddhist culture. The decorative patterns symbolizing the authority and power of Buddha and Bodhisattva in Dunhuang patterns are referred to as round light, neck light, head light, or top light. From the Northern Dynasty to the Sui Dynasty, the round light pattern mostly took the implication of Buddhism "brightness" as the theme, and used the flame pattern to foil the scroll grass pattern in the form of a carved disk for decoration. The round light pattern of the Tang Dynasty was praised by the Gupta Empire as the "golden age of Indian art". The influence of artistic style (320-600 AD) is mainly influenced by the magnificent and rich lotus pattern, which is drawn within the framework of a multi-layer concentric circle structure with circular light patterns. The decorative effect is both simple and magnificent, as well as noble and beautiful.

The circular light pattern is generally composed of lotus patterns, ball patterns, pomegranate patterns, curly grass patterns, or geometric patterns. Each layer of patterns is decorated and arranged around the circular light in a symmetrical, uniform, continuous, and balanced manner. The circular light patterns of Buddha statues are often represented by lotus petal peach shaped patterns and round flowers interspersed with rolled grass patterns to express the sanctity of Buddha; The circular light patterns of Bodhisattvas are often combined with rolled grass patterns, half round flowers, and lotus petal peach patterns to express their solemnity; The disciples of Buddha use a round pattern with a round light pattern to express their solemnity.

## **2.4 Characteristics of Dunhuang Caisson Patterns**

The decorative pattern system in Dunhuang's caisson is relatively complete. From the early Northern Dynasty to the Sui Dynasty, the shape of Dunhuang grottoes has gradually evolved into a covered bucket shaped top cave, with the square area at the center of the top decorated with caisson patterns. The early caisson patterns were simple and bold, with lotus patterns as the center and water vortex patterns surrounding the outside. The four sides were

decorated with flying sky patterns and flame patterns, and the edge decoration patterns were mostly represented by continuous patterns such as honeysuckle patterns or geometric patterns. The structure of the Sui Dynasty caisson has been fixed as a three-layer structure consisting of square wells, edge decorations, and hanging curtains. The patterns are also rich in unique era style and artistic characteristics, with the Persian style bead pattern as an important representative. The decoration of the Dunhuang Grottoes in the Tang Dynasty was more rich and magnificent than that of the Sui Dynasty.

### 3. THEORETICAL EXPLORATION

The style is characterized by a silk woven canopy hanging on the top of the cave. The patterns of the caisson include patterns of precious flowers, auspicious beasts, and flying sky. The outermost hanging curtain is decorated with gorgeous wreaths and other decorations. The patterns are complex and layered, further enhancing the visual dimension of the Tang Dynasty caisson. Digital mediation means that a dispute must be mediated before trial. In other words, digital mediation means that when both parties enter the court for litigation, both parties are informed of pre-litigation mediation, and the advantages of pre-litigation mediation, mediation members or organizations, and the effectiveness of agreement reached by mediation are explained to the parties. To guide the parties to the choice of pre-litigation mediation. The reason for compulsory mediation is based on the following reasons: First of all, most data disputes take the form of data interest disputes, mediation has universal applicability and wide application, mediation is not only carried out by civil organizations or associations, in fact, as a common dispute resolution mechanism, mediation is often used at the court level, such as pre-litigation mediation, mediation in litigation and so on. There are two reasons why so much emphasis is placed on the role of mediation in various systems: first, the primary function of making laws is to settle disputes, which coincides with the purpose of mediation, and even the difference between the role of law and the latter is only whether it has a coercive force. Secondly, as a means to resolve disputes, mediation has the advantages of short cycle, low cost, high efficiency and flexible handling methods[10]. Especially in the context of the digital era, data infringement problems and other types of disputes are frequent, which shows its vital role, and can reduce the cost of dispute resolution to the greatest extent.

#### 3.1 The Application of Dunhuang Patterns in Visual Communication and Sustainable Design

The Dunhuang Grottoes are a fusion of civilizations from different periods in China and the West, creating a unique artistic style, era characteristics, and cultural spirit that embodies the essence of Dunhuang. Through the analysis of the structure, shape, color, technique and style of Dunhuang decorative patterns, it is helpful for designers to use the concept of sustainable design to carry out creative transformation and innovative design of visual communication. It not only enhances the influence and attraction of the excellent traditional Chinese culture represented by Dunhuang culture, but also reveals the cultural spirit contained in Dunhuang patterns, which has important reference significance for contemporary Visual communication. In view of this, it is worth learning from some courts to make pre-litigation mediation compulsory. The courts guide the parties to pre-litigation mediation by sending the Notice of Pre-litigation Mediation and other documents to both parties for reading before litigation, and by introducing the time limit, venue, advantages and personnel allocation of mediation, etc[11]. The mediation period is set at 30 days. If the parties refuse to mediate or do not reach a mediation agreement within the prescribed time limit, enter the proceedings, the advantage of this approach is that the parties can conduct mediation, without entering the proceedings to their own interests litigation and the other party to consult. This practice has a natural priority in the field of digital disputes. Data, as a kind of intangible property, has the characteristics of non-exclusive competition and sharing, so that the interested parties can use it at any time and on any occasion without interfering with others. In the case of disputes, the interests of both parties can be sought to maximize the interests in the litigation. They will exaggerate their own losses and the gains of the other party. In this case, direct litigation is more likely to intensify the conflict between the two parties, while pre-litigation mediation gives both parties another institutional choice, which can identify the interest appeal center of both parties, and then solve the problem in a more targeted way.

#### 3.2 Applying decorative elements of Dunhuang patterns to Visual communication

From the most basic edge decoration pattern elements to the systematic and complete caisson pattern, Dunhuang patterns have the visual law of two-dimensional space. Under the rule of formal beauty, from the perspective of contrast and harmony, symmetry and balance, structural proportion, rhythm and rhythm, and multiple unity, Dunhuang patterns create new design language and artistic conception through contemporary Visual communication. For example, the most distinctive flying pattern in Dunhuang caisson patterns has become a

unique historical and cultural symbol, which is widely used in contemporary commercial advertising, stage art, packaging design and many other aspects. It can be said that the flying pattern will be associated with the art of the Mogao Grottoes of Dunhuang as long as it is seen. The outer packaging of Gansu "Lanzhou" cigarettes integrates regional cultural attributes, conducts market research and design positioning, adopts flying patterns as the visual design element of the packaging, and utilizes the concept of sustainable design to digitize the flying patterns, optimize the details of the patterns, improve visual recognition, and make the Dunhuang flying sky that appears on the "Lanzhou" cigarette packaging agile and free, The broad and inclusive attitude has become a brand totem, connecting the past and present, and injecting cultural heritage and connotation into this packaging in an inclusive manner.

### **3.3 Apply the colors in Dunhuang patterns to Visual communication**

The color elements of Dunhuang patterns make use of the changeability in different shapes, spaces, locations, areas, and textures, and combine the interrelationships among the constituent elements according to certain color laws to create new color effects. The ingenious application of colors in Dunhuang patterns to Visual communication requires comparison and coordination laws. In the design process, grasp the color phase, brightness, purity characteristics of color elements, and position the cold, warm, light, quaint, and elegant color tones tend to balance the contrast between the main color, coordination color, and embellishment color, thus achieving a balanced and unified visual effect. For example, the design of the "Dunhuang Poetry Scarf" series, which is jointly designed by the Dunhuang Research Academy and Tencent brand, is inspired by the pattern of Dunhuang caisson. It extracts more than 200 design color elements from Mogao Caves, including three rabbits sharing the ears, hundreds of birds courting the phoenix, and nine color deer. The main color tone of the screen of the nine color deer themed silk scarves is the stone blue color in the Dunhuang pattern. The scene is a beautiful nine color deer walking in the fairyland of green mountains and auspicious clouds, and the coordinated color is the yellow sun, Red ribbons adorn it, embodying the rich historical heritage and cultural essence of Dunhuang culture in a harmonious and elegant color scheme and design.

### **3.4 Multiple subjects participate in digital dispute diversion**

In the face of such problems, if the digital dispute enters the litigation process, in the case of uncertain whether it can be supported, the parties will put forward these claims and strive for their own interests to maximize, so in the litigation process, it will spend a lot of manpower, material resources and financial resources to deal with[12]. By providing the option of mediation, if the parties choose to mediate, a 30-day cooling-off period for mediation may give both parties a buffer opportunity. If mediation fails after weighing advantages and disadvantages, at least in this process, both parties will make clear their interests. At this time, we will save a lot of judicial resources through the litigation docking procedure when we are conducting litigation. First of all, the court takes the lead, classifies and summarizes the cases that flow into the court, involving illegal data crawling, illegal data use and other issues, and the professionals of the digital platform will mediate; By clarifying the interests of both parties, both parties can reach an agreement under the guidance of the court. However, due to the particularity of data, the court will also be overwhelmed when dealing with digital disputes. Due to the particularity and professionalism of such objects, judge mediation is sometimes ineffective. Compared with the traditional method of relying solely on judges to deal with complex and changeable digital disputes and contradictions, it is undoubtedly a better choice to absorb multiple subjects for mediation. The multiple subjects here include not only experts and scholars who have research on the data, but also industry and professional mediation organizations mentioned above for collaboration[13]. The collaboration here is a customized dispute resolution model based on the particularity of digital disputes and the roles of different subjects in digital disputes. The digital platform provides technical support for data transactions. When disputes enter the judicial level, the compulsory mechanism of digital dispute mediation is used. In the mediation stage, the court and industrial mediation organizations cooperate. Big data exchanges play the role of transaction organizers and compliance regulators, so when such disputes enter the court, big data exchanges should also provide corresponding technologies to cooperate with the court to conduct digital dispute mediation in the case of "clear responsibility", and because the data can be traced and identified, under the cooperation of such multiple subjects, The efficiency and success rate of digital dispute mediation will also be greatly improved[14].

#### **4. STRATEGIES FOR PROMOTING THE LEVEL OF INFORMATIZATION MODEL OF PHYSICAL EDUCATION TEACHING IN VOCATIONAL COLLEGES**

On the one hand, the emergence of digital platforms has broken the order construction model of government management and judicial centralization under the traditional economy, and on the other hand, it is also gradually forming a trend of decentralization of digital platforms to formulate technical norms and rules. In this decentralized governance model, the norms formulated by the digital platform are a kind of "soft law", which has no direct binding force on other entities, and can only have an external effect when it involves the platform or the business. Transactions and circulation within the digital platform must comply with the norms established by the platform, which is a trend of decentralization, that is, when the data breaks the traditional governance, it reconstructs a new governance model - decentralization[8]. This center is launched around the digital platform, because it has a large number of data resources, although these data come from merchants and customers. However, data can only be presented with technical support, and in this regard, it seems more appropriate to resolve digital disputes through digital platforms. However, as an economic organization, it is obviously not feasible for digital platforms to solve digital disputes. Although digital platforms have innate technical advantages and negotiation ability in resolving digital disputes, digital platforms also have significant disadvantages, and these issues have to be legally regulated by the government or judicial organs. However, the big data exchange established by the government, as an intermediary organization of exchange trading, except for a few normal operations at present, its management and media functions are difficult to play their role in the case of small data transaction volume. How to make reasonable arrangements for the relevant entities of these data transaction circulation and data dispute resolution? To improve the digital disputes in the absence of legislation to explore a reasonable solution path has become a problem to be solved by multiple collaborative mechanisms[9].

##### **4.1 Accelerating the implementation of information management system and system in Vocational Colleges**

The COVID-19 has brought about unprecedented changes to the physical education teaching in vocational colleges. Although the modern information technology teaching is integrated with the offline course teaching, the teaching effect and quality need to be improved. The informatization construction of physical education courses in vocational colleges has made some progress, but there are many problems emerging, such as less integrated informatization teaching in the classroom, no improvement in the overall classroom reconstruction of physical education, no construction of diversified informatization education technology and resource platform, teachers' informatization technology literacy to be improved, and generally weak information processing ability. The development of online learning resources, innovative teaching methods ,the school puts forward reasonable suggestions for the construction of sports infrastructure, promoting the construction and integration of vocational education informatization, and further improving the teaching informatization mode of Vocational Colleges' sports courses, so as to better promote the educational informatization development of Vocational Colleges' sports courses in the post epidemic era.

##### **4.2 Constructing the resource platform of multi information teaching mode**

It is a naive fantasy to try to list all kinds of disputes and simply set rules for mediation. Good system design must be built on the basis of good supporting facilities. In today's modernization of the rule of law, people try to build a procedural system and dynamic adjustment system that can meet the diversified needs of social subjects, including negotiation, mediation, arbitration, litigation and other dispute resolution methods. The advantages of mediation are short time, low cost of rights protection, and full consideration of the interests of both parties. At the same time, the interests of disputes in modern society are becoming more and more clear. In combination with digital disputes, both parties always have a purpose in the use or crawling of a certain data, and the user's purpose is different, and their claims in litigation or mediation will be different, which can be roughly divided into: (1) The market, that is, attempts to obtain or maintain its exclusive market dominant position, does not allow unauthorized use, his purpose is more to stop the infringement, and requires compensation for losses; (2) Compensation, that is, to claim liability or pay for use, to inform other users or potential users to collect permission and pay fees, its purpose is to demand compensation, otherwise stop the infringement; (3) Obtaining the right to use, that is, obtaining the consent of a party to obtain the sharing of certain data, etc.

##### **4.3 Reconstructing the teaching process of Physical Education**

At the present stage, higher vocational colleges' Sports information-based teaching, based on the actual situation of vocational colleges, expand the teaching system, carry out discussion and analysis, classified collection, summary and induction in stages, so as to achieve the comprehensive improvement of sports classroom teaching level. At present, physical education teaching relies on a number of information-based teaching technologies. Therefore, the two-line mixed organization teaching mode of physical education information is the focus of teaching and needs to be implemented in stages:

1. Students' independent exploration of progressiveness virtual classroom. Teachers release classroom guidance tasks, upload teaching resources, group discussion, Q & A discussion, and regulate the process through the multi-information teaching model resource platform. Students conduct independent exploration, raise questions, and online discussion;

2. Offline class, research and discussion. The teaching organizes summary and feedback for students in the independent exploration stage first, and then explains their key and difficult points and fallible points. Teachers and students work together to solve difficult problems and explore problems, and conduct action demonstration, arrange exercise mode and exercise intensity, exercise volume, hierarchical and phased exercise time, summarize the class, and assign homework;

3. The online classroom is used to expand and consolidate. Teachers release digital tasks and assignments online, review assignments, organize discussions, answer questions and solve puzzles, and provide digital feedback. Students carry out expanding and innovative online learning, online discussion, and timely adjust learning plans.

#### **4.4 Strengthen physical education teachers' ability to skillfully use information technology**

In the post-epidemic era, sports informatization teaching puts forward certain requirements for the informatization ability of full-time physical education teachers. In addition, to build an informatization system teaching system in higher vocational colleges, it is necessary to enhance the comprehensive quality of teachers, strengthen the construction of physical education teachers, improve the comprehensive quality of teachers, and promote full-time physical education teachers to skillfully use the double-line integration teaching mode. When applied to the actual teaching process, physical education teachers need to clearly understand the actual impact value of the online teaching mode, reasonably integrate the beneficial teaching resources actually needed for teaching, actively use the modern online teaching software, reconstruct the classroom in combination with offline physical education, be familiar with the teaching process, and promote students' diversified learning of sports basic theoretical knowledge, life and health knowledge and sports special skills.

## **5. CONCLUSION**

This paper discusses the basic characteristics of Dunhuang pattern elements under the concept of sustainable design, and analyzes the application rules in Visual communication. The in-depth and systematic protective excavation of Dunhuang cultural elements in the excellent traditional Chinese culture, and the creative transformation of the formal beauty rules in combination with modern aesthetic needs, provide more possibilities and innovation for today's Visual communication, and better beautify and serve the society. This not only enhances the influence and attraction of Dunhuang culture, but also reveals the great integration, pluralism, humanistic feelings. The cultural spirit of advocating morality and promoting goodness. In the process of the development and research of sports information-based teaching mode in vocational colleges, it is necessary to take the multi-information-based teaching mode resource platform as the main starting point, through the online network platform, teachers and students carry out exploration and cooperative learning of sports theoretical knowledge and technical skills, and comprehensively control the sports information-based teaching process, learning methods and online teaching process by combining online and offline multi-element comprehensive evaluation with students' evaluation results, Cultivate students' good study habits, broaden students' access to sports knowledge, further strengthen students' knowledge construction ability, and realize the further improvement and development of sports information technology teaching mode in vocational colleges.

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