



# The Regeneration Research on the Intervention of Digital Design into Dunhuang Flying Apsaras

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**Abstract.** The unique image of the Dunhuang Flying Apsaras, characterized by flying figures with elegant and light bodies, enjoys public popularity. With the development of digitization, the image of the Flying Apsaras has gradually transformed from the traditional native to digital regeneration and the elements of Flying Apsaras have been widely applied in digital design, forming the “Flying Apsaras” of the new era. Digital design has also become a way to communicate the art of Dunhuang Flying Apsaras, which also boasts new development both now and in the future. Therefore, this paper briefly analyzes the artistic characteristics of Dunhuang Flying Apsaras, discusses the digital design interventions with the reorganization and regeneration of Dunhuang Flying Apsaras elements, and concludes with feasible suggestions and reflections for the development of Dunhuang Flying Apsaras regeneration.

**Keywords:** Dunhuang · Flying Apsaras · Regeneration · Digitization

## 1 Introduction

Dunhuang fresco art is a brilliant artistic crystallization in the treasure house of Chinese culture, and is also a world cultural heritage. Mural art forms are rich in subject matter and expressive styles, and its picture and composition reflect the integration of diverse cultures. The development of Dunhuang murals in different dynasties showed different colors and styles, which also had an important impact on the history of Chinese painting.

The most common and most representative artistic image in Dunhuang Apsaras frescoes. The image of the flying apsaras in Dunhuang has gradually formed unique artistic characteristics since the Beiliang. Its apsaras image throughout each cave, a large number, a long time, diverse style, won everyone's love. The flying apsaras in Dunhuang FREScoes, which lasted for more than a thousand years, is the best embodiment of Chinese culture because of the change of dynasties and the continuous integration of cultures.

## 2 The Artistic Characteristics of Dunhuang Flying Apsaras

Known as the “treasure house of Buddhist art”, the abundant and splendid Dunhuang murals are one of the cultural treasures China takes pride in. And the most striking thing

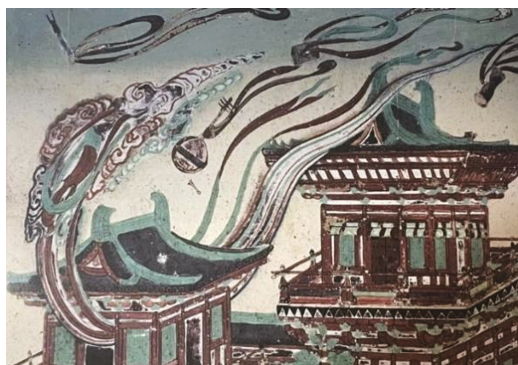
about Dunhuang murals is the Flying Apsaras, a figure commonly seen in almost every grotto. The beautiful models, dynamic lines, and gorgeous colors of Flying Apsaras all fascinate the viewers. Therefore, the artistic characteristics of Flying Apsaras are then analyzed from these three aspects, namely model, color, and line.

### (1) The Beauty of Models

The beauty of Dunhuang Flying Apsaras lies in three main aspects, the beauty of models, the beauty of lines, and the beauty of colors, which are mutually inseparable and play a complementary role. The first one to be discussed is the beauty of models. The key to the beauty of models is grasping the flying movement of the figures and the flying rhythm and rhyme. The flying modeling mainly relies on the stretching limbs, S-shaped body flip, flowing skirt, and flying scarf to represent the dynamic beauty of Flying Apsaras. The flying scarves, in particular, play a decisive role in the dynamic effect, which can reflect not only the lightness of the flying body but also the dynamic beauty. Taking No. 217 Mogao Grotto as an example, the flying figure turns around in the air to reach for her musical instrument. Her S-shaped body passes through the open window of the pavilion to the sky, as light as a swallow, displaying both the graceful posture and flying streamers. With a burst of celestial music seemingly coming out from the pavilion, a beautiful scene of the Buddhist world is constructed (Fig. 1).

### (2) The Beauty of Lines

Line drawing, serving as the foundation of Chinese painting, is also the main means of modeling the Dunhuang Flying Apsaras. The lines of the flying figures are often the best way to reflect the dynamic beauty of Flying Apsaras. Typical of Chinese painting, the lines are smooth, vague or solid, sparse or dense. In the Six Dynasties, the famous painter, Xie He once mentioned the lines in his theory of *Six Rules of Painting* that the first rule lies in dynamic style while the second in forceful brush strokes. It was later during the Flourishing Tang Dynasty that Wu Daozi, known as the sage of painting, brought the art of Chinese figure painting to its peak through line drawing. Wu Daozi's style of painting was characterized by his use of the "orchid painting" technique and his



**Fig. 1.** The Flourishing Age of Tang Dynasty, No. 217 Mogao Grotto (Source: <Dunhuang Silk Road pearl Buddhist cultural treasure>)

emphasis on line drawing rather than color, a style that was later called “The Sashes in Wu’s Painting Flutter as if in the Wind”.

### (3) The Beauty of Colors

Dunhuang murals are known as the “living treasure trove of color”. And the Flying Apsaras has witnessed the formation of their respective distinctive color style with different colors taken on in different eras. These murals, though having survived the years, still remain gorgeous and stunning. Vibrant and elegant, ore pigments are mainly used in Dunhuang murals, which are also not easily discolored and peeled off. Sharing the same skin as ordinary people, Flying Apsaras are decorated mainly with bright dresses and streamers in the colors of red, blue, etc., to highlight the flying figures.

## **3 The Regeneration of the Intervention of Digital Design into Dunhuang Flying Apsaras**

### (1) The Connotation behind Flying Apsaras Regeneration

The regeneration of Flying Apsaras stands for the second creation of art and the second life of the culture. As part of the Dunhuang art, Flying Apsaras is an artistic image in Buddhism, a flying figure with unique Chinese characteristics, and also a miracle in the history of world art. Today, in the 21<sup>st</sup> century when the tourism industry in Dunhuang has flourished, Flying Apsaras has become a catalyst for attracting visitors. And the image of Flying Apsaras is no longer solely representative of Buddhist themes in native art but is gradually taking on a popular and secular character.

The transformation from native to the regeneration of Dunhuang Flying Apsaras is not about rigid copying or plagiarizing but a process in which elements are extracted and reconstructed from the original and new methods and information technology, such as game apps, digital photography, and virtual reality, are adopted. The “regeneration” of the Dunhuang Flying Apsaras aims to endow Flying Apsaras with a novel artistic style through a series of elemental improvements and the addition of technology. At the same time, technology has enabled the permanent preservation of Dunhuang Flying Apsaras, rectifying the traditional vulnerability to breakage. The dynamic display also exposes the public to a new visual experience in interaction. Instead of the limited visual experience with the guide holding a flashlight to explain, the digital technology completes the integrity of the cave to give the visitors an immersive feeling. This is undoubtedly the second life and second creation rendered to Dunhuang art. Therefore, the current culture and technology have already developed a close relationship. While technological advancement has brought revolutionary changes to culture, the integration of culture and technology has enabled the decorative functions of Flying Apsaras to be reflected in technology. Only by absorbing the artistic essence and endowing traditional culture with new connotations can culture go further.

### (2) The Regeneration Path of Flying Apsaras in Digital Design

Artistic practices in different fields deconstruct the religious space and place the classics in different socio-historical contexts to secularize them [1]. The Flying Apsaras design

under the digital design of Dunhuang regeneration refers to taking Flying Apsaras elements as the main part and placing them within digital life through secondary reorganization and modern technology, thus turning them into the current new classic. The regenerative path of Flying Apsaras design has been specifically embodied in game design, mini program design, and graphic design, which have yielded certain accomplishments.

### 3.1 Flying Apsaras and Game Design

The game is a non-utilitarian system of pleasurable and challenging rules that attracts the voluntary participation of gamers. Game design is the design of a creative gaming process that addresses the pleasurable or challenging experience in non-real situations [2]. The Dunhuang Flying Apsaras have also been used in game APPs, such as the song Meet Dunhuang jointly produced by the Honor of Kings Company, Dunhuang Academy, and QQ Music as well as the online release of Yang Yuhuan's gorgeous skin of Flying Apsaras. The main color of Dunhuang adopted by the skin and details such as playing-pipa-behind posture all highly interpret Dunhuang culture. In this way, the audience can not only feel the charm of traditional music but also have a detailed understanding of the game characters, which conveys to young people both visual effects and more cultural connotations. Through the combination of the Internet and modern technology, innovations to traditional music will not lose its original cultural core, but rather inspire more interest in the new generation of young people. According to Hou Deyangi, Vice President of Tencent Music, "Dunhuang culture exists as a world-renowned humanistic treasure. As an important part of Dunhuang culture, the Internet and music and other pan-entertainment means can be used to help rejuvenate the ancient Dunhuang culture. The innovative form combining both the ancient and modern will arouse more young people's interests in Chinese traditional cultural treasures and encourage them to understand and inherit" (Fig. 2).



**Fig. 2.** The Effect of In-game Application (Source: Screenshot of *Honor of Kings*)

### 3.2 Flying Apsaras and Mini Program Design

The most important feature of mini-programs lies in their simple access through code scanning without downloads or installations. Users do not need to worry that the application would occupy too much phone memory. Under the concept of “using it or leaving it”, this product boasts a high degree of applicability and applies to cell phones with any system, bringing more convenience to users.

With the advent of the digital age, the art of Flying Apsaras has been deeply intertwined with digital media technology, not only breaking through the traditional expression of Flying Apsaras but more endowing Flying Apsaras culture with a better communication way. The mini program design of Flying Apsaras targets using information technology to protect flying figures so as to reduce the damage to the murals and uncover the artistic charm and cultural significance of the Flying Apsaras. “An Online Trip to Dunhuang” serves as the first WeChat mini program jointly launched by Dunhuang Academy, People’s Daily New Media, and Tencent to appreciate Dunhuang Grottoes Art. Since its launch, it has achieved more than 5.51 million independent users, more than 22 million readers, more than 1.2 billion total exposures, and more than 2,600 media reports [3].

“An Online Trip to Dunhuang” is known as a cultural legacy in the digital age. The use of information technology to achieve three-dimensional communication of “VR” grottoes and mural dynamic communication presents cultural heritage in a digital way and gives cultural heritage more possibilities and challenges. For example, the “Panorama Grottoes” in “An Online Trip to Dunhuang” adopt VR technology to simulate and restore the real cave in three dimensions, blending the real with the virtual to enable an immersive experience. Another example is the addition of the “Light Up Mogao Grottoes” function on “An Online Trip to Dunhuang”, which uses blockchain technology and mobile digital technology to present online the night lighting view of Mogao Grottoes over a thousand years ago for the first time. The traditional practice of lighting lanterns is once again restored to the Internet to pass on the folklore of lighting lanterns in Mogao Grottoes and allow more people to understand and join in the grand spectacle. Once “Light Up Mogao Grottoes” is used, users can go through the location and number of the lightened cave within the panoramic cliff body. The more people light up the caves, the brighter the grottoes will be. This function, considering users from their perspective, starts from the “usability” and “user experience” to guarantee user participation through interactive design, involving users to be a member of Dunhuang culture inheritance (Figs. 3 and 4).

### 3.3 Flying Apsaras and Visual Communication Design

Visual communication design mainly uses visuals as a way to communicate and express, and creates through words, images, and symbols in combination with software such as digital technology, and computer technology. “Huiyun Palace”, a flying sculpture created under the combination of graphic design and 3D design software as an example not only features the beauty of smartness and elegance in the overall modeling but also embodies a high level of materials in details. It can be concluded that the three-dimensional design can make the work more three-dimensional and detailed, giving people a strong visual impact effect.



**Fig. 3.** Effect within the Interface (Source: Screenshot of *An Online Trip to Dunhuang*)



**Fig. 4.** Effect within the Interface (Source: Screenshot of *An Online Trip to Dunhuang*)

Nowadays, the visual of graphic design has been relatively common and three-dimensional design has also been rapidly developed. Now graphic design and three-dimensional design are closely linked and complement each other. With the rapid development of society improving people's aesthetic level, graphic design alone fails to satisfy the public. For this reason, designers begin to present graphic design with three-dimensional design technology so that graphic design can be promoted by three-dimensional design, which is also the inevitable phenomenon of the times. Such a combination of three-dimensional design and two-dimensional design also contributes to the entire design industry (Fig. 5).





**Fig. 5.** Design Effect (Source1: <https://www.zcool.com.cn/work/ZNDExNDk0Njg=.html>)

#### **4 Design and Reflection on the Intervention of Digitalization into Flying Apsaras**

With the development of technology in recent years, mobile platform products have gradually attracted public attention and witnessed accelerated development. Innovative design thinking and methods have also existed in cultural APPs and mini-programs. It can thus be seen that cultural APPs and mini-programs prove to be effective in spreading and protecting Dunhuang Flying Apsaras, making it easier to create interesting content, avoid didactic communication, and explore more attractive ways of expression.

##### **(1) The Current Design Status of Digital Regeneration of Flying Apsaras**

As the “non-renewable and non-permanent” nature of Dunhuang cultural heritage adds to the urgency of protecting Dunhuang, the Dunhuang Academy has proposed the digital preservation of Dunhuang. Earlier in 2017 did Dunhuang Academy sign a cooperation agreement with Tencent to jointly promote the preservation and communication of cultural heritage. Tencent has combined Dunhuang culture with the entertainment industry to spread culture in ways that young people enjoy. Specifically speaking, in the gaming field, Honor of Kings launched “featured skins of Dunhuang culture” as dominated by Yang Yuhuan’s “Meet the Flying Apsaras”; in the music field, Dunhuang Academy cooperated with Shanghai Conservatory of Music and Tencent QQ Music to hold the “Ancient Song Recreation Competition”. Themed under Dunhuang, the competition required participants to recreate ancient songs. This competition attracted a large number of young independent musicians to participate, thus enabling young people to understand Dunhuang music culture and create music works in combination with modern music.

Unfortunately, APPs about Dunhuang Flying Apsaras remain few and far from mature. Neither have they considered the real demands of users nor designed the framework in a reasonable way. For example, the APP “Dunhuang Flying Apsaras” released by Yunlian Technology Company contains only a simple display of murals and statues with a monotonous arrangement of reproduction materials, the baldness of which is

prone to cause visual aesthetic fatigue. In addition, the framework design needs to be more logical and clearer and level to be richer, leaving many aspects to be improved. The mini-programs about Dunhuang Flying Apsaras are so few that no other related mini-programs except “An Online Trip to Dunhuang” have been seen in operation.

## (2) The Design Countermeasures for Digital Regeneration of Flying Apsaras

Many mini-programs, game design, and graphic design on the market only focus on sensory design, targeting the visualization of the product and the functionalization of the product while ignoring the user experience. It is such a big misconception to neglect people-centered design. Therefore, the following four design countermeasures are proposed.

1. User-centered Design. It is suggested to develop a strategy to optimize the user experience. User-centered design is to design for users’ actual needs. And such a concept should be implemented throughout the whole design process. For example, users who use culture APPs prefer the addition of some interactive mini-games to increase the interestingness instead of boring official text transmission, which will bore the users with monotonous sections.

2. App Interaction Framework Design. As expected by users, an APP should be easy to use, funny and interesting. Thus, a hierarchical structure should be introduced in the design of the information architecture, which enables users to understand more about how to use the APP. This structure, for example, applies to the changes in styles of Flying Apsaras paintings in different historical periods and the changes in Flying Apsaras costumes in different historical periods. The structure layer determines how the APP works, and the framework layer defines the function and form.

The framework layer includes interface design, navigation design, and information design. The interface is designed to help users complete tasks and make them understand and use the APP in the fastest ways. A successful interface design features a clear separation of priorities, allowing users to see the most important parts at a glance with the unimportant parts omitted or obscured to prevent disturbing users. Navigation design enables users to know their current locations and to jump to another page smoothly. Information design, an extremely important step, is expected to arrange information and organize the huge amount of information about Dunhuang Flying Apsaras in a way that reflects the user’s thoughts and goals.

1. Visual Design. A really good product, in addition to good interaction design, often necessitates visual design as beautiful visual design can bring a pleasant mood. The overall visual elements of Dunhuang Flying Apsaras can adopt an ancient design style, for example, the lotus flower style in the three rabbits algae of No.407 Sui Grottoes can be extracted as the design material to design the button.

2. Integrating Artistic Value with Ideological Value. Dunhuang murals boast excellent composition, colors, and lines, which are the embodiment of artistic beauty. It is recommended to boldly use different artistic styles to design APPs and mini-programs concerning Dunhuang Flying Apsaras. For example, when designing icons, the flying streamers can be extracted to express their floating beauty with beautiful and soft lines; when designing an APP interface, the white clouds and white doves can be extracted from murals as the base color to endow users with a sense of a wonderland. From the



performance of Dunhuang Flying Apsaras can users see the dynasty evolution of Dunhuang Flying Apsaras, the connection between Dunhuang Flying Apsara and music, and the connection between Dunhuang Flying Apsara and dance. It allows the user to not just limit to the surface of the Flying Apsaras models but more understand its spiritual connotation and present the culture of Flying Apsaras more powerfully.

### (3) The Reflection on Digital Regeneration Design of Flying Apsaras

The most inseparable thing about designing APPs and mini-programs is user experience. All the design and functions serve users and also decide whether the popularity of the APP or mini program. Thus, the following three points of design reflection are summarized. Firstly, it is imperative to reflect on the real needs of users, start from the user's point of view, and design the style favored by users rather than blindly designing the mobile platform. For example, some APPs fail to take into account the acceptance of the user. There is no market for the obscure and difficult functions accepted only by a small number of users. Secondly, digital technology should be utilized to break through the traditional mobile application model. The most common feature of Dunhuang game design and mini program design is to instill users with boring knowledge with copied words or murals displayed like an e-book, which is also a common problem now. In fact, the characteristics of Flying Apsaras, the Flying Apsaras of different times, and the evolution of Flying Apsaras paintings can all be integrated with AR, VR, games, animation, and blockchain technology. It is under the "technology + culture" nourishment that digital technology will provide a new way for traditional culture and also spread the traditional culture in a better way. The third point is to break away from graphic design and embrace 3D design, combining each other. What also needs to emphasize is to extract the important elements concerning the changes of Dunhuang elements based on the originality of graphic design so as to demonstrate the Flying Apsaras of the new era.

## 5 Conclusion

In such an era featuring a deep integration of culture and technology, culture and technology are penetrating each other implicitly, scientific inventions and creations are integrated into the imagination and emotions of culture and art, and artistic creation and exploration of beauty are permeating the rationality of science and technology, and culture and technology are increasingly moving towards deep integration [4]. In modern digital design, it is suggested to reasonably draw on traditional culture to take the essence and combine it with digital technology to better promote traditional culture. The application of traditional culture is not a simple pile of copy, but a better integration and regeneration, providing traditional culture with a better development prospect in the application and ushering in a new path of traditional culture. Therefore, in digital design, not only the artistic essence of the previous generations should be retained, but also the uniqueness of the combination of digital design and traditional culture be reflected, thus facilitating the integration and regeneration of digital design and traditional culture. It is believed that the intervention of digital design will also diversify the presentation of traditional culture and that traditional culture will embrace a brighter future and even go international.

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