Building the Illusion of Reality: Digital Construction and Communication of Stage Art

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Abstract: Since its birth, the stage art represented by theatrical performance has been far more dependent on presentation forms and dissemination media than other kinds of artistic expressions. Since the 20th century, with the rapid development of science and technology and new media, the digital construction and dissemination of stage art has gradually become a new trend in the development of performing arts. Especially in the context of the covid-19 epidemic, contemporary theatre is not only a creative space for directors and actors, but also a comprehensive creative space that integrates lighting, materials, sound effects and other elements, and the role of technology in stimulating the vitality of stage art in the post-epidemic era is increasingly prominent. In this paper, we will start from the history of digital development of stage art and combine it with actual cases, to analyse its future development trend.

1. A review of the digital development of stage art

In the tragedies of the ancient Greek period, the actors would often descend from the roof to the interior of the theater in a gondola whenever the gods descended to earth. During the Renaissance, the use of perspective was exploited to the fullest extent on the framed stage, and the famous 19th century European dramatist Adolphe Appia（1862）realized that stage design did not need to copy the real life situation as much as possible, but should choose the most expressive techniques and skills to show the content of the dramatic story.[1] Due to the limitations of technological development and scientific concepts, the stage art currently did not really involve the use and construction of digital technology, but its pursuit of the artistic goal of building "the illusion of reality" is obvious.

In the early 20th century, British theatre director and stage designer Gordon Clay, an innovator in the art of staging, came up with the idea of using a single element strip screen instead of a set during a performance, which was integrated into the auditorium and used light and shadow effects to complete the set requirements for the performance on stage. Due to the limited state of technology at the time, this practice once led to a live accident during a performance in which the curtain collapsed extensively, but it still laid the foundation for the rapid development of digital construction and dissemination of the theatre arts in demand afterwards.

Since the 1960s, the speed of development in the field of science and technology has increased

significantly in the world, and many new materials and technologies have emerged, resulting in a great number of new ideas and creative methods in stage performance. The Czech stage designer Josef Svoboda（1920-2002） once proposed that "the technical elements in a performance should form a new partnership with the content of the performance", and in his theatrical works such as "Their Day" and "Prometheus", he made extensive use of live video, composite projection, multi-screen slides, program-controlled projection and other technological means. These attempts, which seemed unorthodox at the time, provided successful reference cases for the later digital development of stage art.[2]

With the accelerating development of science and technology, many new media art varieties have emerged and become the mainstream trend since the middle and late 20th century, and the integration of stage art and digital means in the field of technology construction and communication channels has thus become closer, and a new definition of stage space has been developed.

2. Digital technology has expanded the live stage affordability

In the performance process, the use of digital technology makes the presentation of stage performances more holistic, and brings more possibilities for the innovation of sound, light and choreography effects. The application of digital technology in the stage performance project is not only limited to the performance site, but also plays an important role in the auxiliary process such as the preparation and planning and design of the stage.

For example, the Central Opera Digital Stage Laboratory, located in Guangzhou, has been upholding the principle of "Applying digital technology to the whole process of the stage choreography industrial" in its preparation process.[3] Effectively help solve the problems of bulky traditional stage scenery production, time-consuming and labor-intensive transportation and loading, easy to damage the original theatre environment and low level of integration, through GPS sensing, projection screen, visualization creation tools, digital stage supervision and scheduling system and other digital means to liberate the theater space or other performance venues in the real scene capacity, reduce the cost of human and material resources and time, but also improve the production efficiency in the operation of the stage art industry.

3. A high degree of integration of light, sound and electricity to enhance the degree of sensory interaction

The most direct manifestation of the digital development of stage art is the deepening of the integration of light, sound and electricity by digital technology in the process of presenting stage effects, and for the audience, the degree of interaction at the sensory level will be enhanced as a result. Restricted by technical conditions, the last century performance production is limited to building simple LED lights background and other practices, in the audience, such a stage is not vivid enough, the stage carries a single scene, it is difficult to stimulate the audience more into the sensory experience. With the field of choreography and art of all-round multi-angle technology upgrade, stage performance of light, sound and electricity with the presentation of the content of the performance gradually reveal a radical change in the audio-visual effect.

"Only Henan——theatrical fantasy city" (hereinafter referred to as "Only Henan") is a theme park containing 21 theaters, which is the largest theater complex in China, jointly built by China Construction Group and famous director Wang Chaoge (1965). Based on immersive theater art, "Only Henan" is built with a unique "phantom city" architecture incorporating high technology and is dedicated to let the audience experience the live charm of theater art in a deep and vivid way. The entire venue contains 21 theaters, including 3 main theaters and 18 small theaters, with a total of 56 spaces, involving nearly 1,000 performers, presenting audiences with 700 minutes of non-repetitive

performances, and up to 125 performances with more than 4,000 minutes in a single day during the peak season.

Behind the huge volume of theater and performance scale, the highly integrated "sound, light, painting and electricity" and intelligent digital control systems play a huge role. For example, the Lijia Village Theatre can uniquely take the audience back to 1942 in rural China using choreography. Through a series of lighting, mechanical devices and smoke devices, create a real visual and auditory effect, for the performance of the important plot to increase the dramatic tension. Because of the realism and shock of the stage design and construction, the audience can be more involved in the performance and gain a more direct theatrical and interactive experience.

4. Stage digital communication adds to the incremental size of the performance market in the post-epidemic era

When people talk about theatrical performances, they agree that the experience of their live performances and the sense of atmosphere are the absolute irreplaceable advantages of the performing arts industry, so the main market for theatrical arts is concentrated in offline physical performing arts spaces. At the beginning of 2020, a new virus swept the world, and various links in the industry chain of the theater industry were at a standstill. As the epidemic was gradually brought under effective control, the doors of performance venues were gradually liberalized, and after experiencing performances being called off and cash flow being broken, the stage performance industry is actively seeking a new turnaround. Edgar Morin, a famous contemporary French sociologist and philosopher, proposed in response to the social impact brought by the crisis of the new crown epidemic: "Between the best and the worst possibilities to be faced, the instinct and desire to survive will lead people to look for new solutions and ways out." [4]During the epidemic, the online performance market began to be put in the spotlight to gain attention, and venue operators realized that opening the online performance market in the post-epidemic era would become an important opportunity for change.

The online market has been explored before the epidemic, and at the forefront of this process is the music market, as early as August 2, 2014, a famous Chinese singer Wang Feng tried to hold an online performance. He held a concert named "peak storm" in Beijing National Stadium, the concert not only in the live performance, but also in cooperation with LeTV, electronic tickets are available for viewers to watch live broadcasts and replays.[5] With the help of streaming media platforms, the online distribution of music has been developed for nearly 20 years, and many music groups such as the Berlin Symphony Orchestra, Vienna Philharmonic Orchestra, London Symphony Orchestra, Tokyo Symphony Orchestra, Shanghai Symphony Orchestra, and National Centre for the Performing Arts of China have opened their audio and video resources of past concerts on their official websites.

As for theater, opera, musicals and dance, the technology for online distribution is still not perfect due to its dependence on live audiovisual effects and the concern of theaters or troupes about copyright protection of digital products pirated copy. After the outbreak, many theaters and troupes reacted quickly to the crisis. The operational development for the online performance market was explored.

"National Theatre Live" (NT Live for short) is an online performance project launched by the National Theatre of the United Kingdom, filmed in high definition and multidimensional at the performance site and broadcast by satellite, with the aim of making the theatrical gems produced by the National Theatre of the United Kingdom available to audiences around the world. Reaching people outside the theatre in HD video. The NT Live series and the MET: Live in HD play resources were released Free online for a limited time during the pandemic, and the number of viewers increased exponentially compared to the pre-epidemic period, with remarkable effects. At the same time, the Royal Opera House's website makes it easy to buy official DVDS of some of its most famous

performances, with just a few clicks to complete the purchase and wait for delivery. Transcending the time and space distance and breaking the restriction of high drama cost, stage art performance products have gained a wider audience on the development road of digital communication.

5. Online digital performances break the limitations of the original space viewing relationship, catering to the needs of the audience

In addition to the integration of digital technology in stage choreography and sensory experience, the application of online digital performance is a further attempt in the process of digital development of stage art. Traditionally, idol group concerts have always been limited by venue and time, and in most cases only a small number of fans can participate. As online digital performances have gradually come into the limelight, some production companies and teams have started to experiment with the possibilities of online digital performances in stage communication.

"City of Reality", the first immersive virtual concert of Chinese girl idol group "The 9", which announced its debut in 2020, is the first content of iQiyi's online performance, which adopts a lot of virtual production technology such as AR/XR technology and audience interaction technology. The show uses a lot of virtual production technology such as AR/XR technology and audience interaction technology, dedicated to creating a great choreography visual effects and interactive experience for the audience. In the early development of digital stage technology, the more mature and common technology is to break the limitations of the stage space through green screen, this technology also has the problem of lack of scene and performance integration for actors to perform out of thin air. The XR technology, or extended reality, used throughout "The City of Virtual Reality" enabled the integration and expansion of foreground, real performers and perspective backgrounds, bringing out the concept and content of the concert as well as the personalities and attitudes of the nine members of "The 9". The concept and expression of the entire concert, as well as the personalities and attitudes of the nine members of "The 9" were all reflected. The performance is a breakthrough in terms of audience immersion and performance experience.

Technology is redefining the stage, as well as the relationship between performers and audiences. Concert organizers are paying more and more attention to audience participation, trying to improve audience experience in an all-round way through the setting and updating of interactive links. The "City of Virtual Reality" production team spent a lot of time on using digital technology to create a more avant-garde and innovative audio-visual effect and paid equal attention to the interactive links and content between the idols and the fan base during the concert. The concert set up a special virtual audience, users through the APP can freely build their own virtual support image to participate in live support and interaction, in addition, the concert site also has a fan on the screen with their idols real-time video link, live with the same frequency entity support stick, fans co-create the stage, etc. All of these are the full consideration and practice of fan groups to participate in the interactive desire.

Iqiyi's massive investment in digital stage technology is to adhere to its high-quality content manufacturing, and its efforts to meet the needs of users have brought more attention and topics for the performance products. The Weibo topic "the9 Concert in the Imaginary and Real City" has been read by 460 million people and discussed by 6.791 million people. The dissemination effect mainly brought by the fan group makes it get a larger degree and wider range of traffic and realization possibility.

6. Technology applications are gradually becoming more common, and the trend of future innovation dividends is weakening

Although the development is rapid, but with the stability of the level of technology and the daily use of technological means, from the current point of view, the application of digital technology

appears the trend of singleness, the innovation dividend of the digitalization of stage technology is gradually weakening. From the opening ceremony of the 2008 Beijing Olympic Games directed by Zhang Yimou, to the performance stage built by virtual reality, digital stage art is no longer unfamiliar to the audience. [6] Subject to economic and technological development and cost constraints, digital application on the stage will not have frequent innovation in the short term, so the emergence of new applications of new technologies will gradually appear more single and universal.

The performing arts market has a huge capacity, and in the post-epidemic era people are getting out of their homes, and the demand for stage performances is on the rise. Combined with the background of online performances being put under the spotlight during the epidemic, the importance of digital stage art by performing arts parties has been greatly increased compared with that before the epidemic. With the active attempts of performing arts parties, more and more performance products using cutting-edge digital art in the industry have emerged, audiences have gradually become familiar with the existence of digital stage art, and the dividend of digital technology innovation that has now been introduced is disappearing at a faster pace. As performing arts producers and producers, finding the competitive advantage of their own products in an increasingly homogeneous market will be the undefeated rule for their sustainable survival. How to have a foothold in the fiercely competitive market of digital stages and how to bring "unexpected" surprises to the audience is something we should continue to think about.

7. There is still a lack of control of the balance between the degree of digitalization and the interplay of performing arts content

On the road to digitalization in theatre arts, while constantly innovating the use of technology, it is also important to pay attention to and control the level of balance between digital technology and performing arts content. When digital forms have become significantly more eye-catching than theatrical performances, we need to be wary of moving away from the original intention of enriching the stage and enhancing the sensory effect of the spectacle to a situation where the opposite is true. As mentioned above, although the first immersive concert of the 9, the City of Virtual Reality, has achieved innovative and groundbreaking results in the application of digital technology for the construction of scenes and the integration of virtual reality, compared to the traditional digital stage, but some obvious imbalances can still be found.

The theme of the concert was "Beyond My Reach, Beyond My Imagination". Based on the different stories of the nine members of the cast, each of them is given their own "city of reality", where they perform in their own unique scenes. However, in the actual performance we can see that the collective figures of the members are only about one-tenth of the overall picture against the colorful and technologically designed backdrop, and the dance movements are not shown too clearly in the camera. For idol groups, dance is an important part of the performance, and the impact of digital technology on the overall presentation of the show is not positive, as audiences expecting the content of the show find that less than half of the time they can see the performers' movements, expressions and performance status, which is clearly a detriment to their experience. This is a major reason why the performance experience is compromised.

In the documentary "Only Henan - The Phantom City of Theatre - A Visit by Shi Hang", Shi Hang, a famous Chinese theatre scriptwriter, mentions "There is always an emphasis on a feast of sound, light, painting and electricity, 'blowing up' distorts the performance, 'feasting' distorts the effect ...... Technical means are used to enclose the space that is not space disturbed by technology, technology is meant to make people forget about technology to get down to what they are feeling."

With the advancement and development of technological means, it is inevitable that more possibilities will emerge on stage. The relationship between artistic content and presentation should

be carefully balanced between the degree of digitalization of the theatre, the use of technology and the content of the performance. In the process of production, consideration should always be given to what is most desirable to be presented in the performance, to avoid a situation where the original intention of the performance is defeated, and the audience's experience of the performance is diminished.

8. Conclusion

The rapid development of science and technology in modern society has made it possible for the theatre arts, including theatre performances and live concerts, to be enriched and diversified. Digital technology plays an increasingly prominent role in the construction and dissemination of theatre art. The high degree of integration of sound and light enhances the sensory interaction of the theatre arts audience. The new digital means are gradually freeing up the capacity of the live stage, enhancing the efficiency of creation and operation within the arts industry, while the digital platform of online performances is further breaking through the limitations of the original spatial viewing relationship.

However, at the same time, the digital development of theatre arts still suffers from the problem of a single application method and a further breakthrough in the form of presentation, and in a certain sense the innovation dividend has diminished. In many cases, there are problems of rigid integration, overwhelming forms and difficulties in balancing content and presentation. Therefore, the question of how to break through existing technical means and integration solutions in a flexible and innovative way, and how to balance the relationship between the content of the performance and the digital stage form, also remains a question worth exploring in the future.

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