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Technological Innovation in Chinese Digital Drama: A Case Study on the Posthuman Transformation of the Performing Subject – Digital Mei Lanfang Analysis

Jingying Zhang

Universiti Teknologi MARA, Malaysia

E-mail: jyzhang1205@foxmail.com

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Abstract

In the global artistic arena, digital performance, a fusion of art and technology is increasingly garnering attention. Accompanied by rapid technological advancements, Chinese performing arts are in a state of continual boundary expansion and exploration of new possibilities. This art form is undergoing a profound and revolutionary transformation with the infiltration and advancement of digital technology. This article, titled "Technological Innovation and Chinese Digital Drama: The Post-Human Transformation of the Performing Subject," delves into how digital technology is innovating traditional Chinese drama by transforming the performing. Centering around the Digital Mei Lanfang project as a pivotal case study, the research demonstrates how digital technology is redefining the subject of drama performance, thereby further redefining the scope and essence of theatrical performance. Employing qualitative research methods, literature reviews, and case study analysis, the article assesses the impact and value of the shift from Natural Human to Posthuman entities as performing subjects in Chinese theatrical arts, driven by digital technology. The research underscores the significance of post-human entities in protecting and disseminating cultural heritage in the digital era. This article aims to expand the boundaries of dramatic artistic expression through the study of posthumans becoming dramatic performing subjects and to provide theoretical foundations and practical references for the future development of dramatic arts. Consequently, this fosters the further development of Chinese dramatic arts in the digital age without losing their original characteristics.

Keywords: Digital Theater; Chinese Drama; Performing Subjects; Posthuman Technology

Introduction

Digital Theatre is a hybrid art form integrating traditional theatrical arts with modern digital technology. It leverages computer-generated imagery, sound, and interactive technology, thereby expanding the expressive capabilities of theatrical arts (Tonkoshkura, 2022). In the 1960s, alongside the

evolution of computer technology and the emergence of digital art, pioneering works began to incorporate digital technology into actors' performances. These integrations of computer technology can be seen as early exemplars of digital theatre. Artists commenced the exploration of the potential of digital tools in artistic creation, and digital theatre started to emerge as a new realm for artistic expression and cultural interaction (Bo, 2022).

As an emerging art form, digital theatre represents a profound integration and innovation of traditional theatrical arts and advanced digital technology. It not only transforms the production and presentation of theatre but also redefines the boundaries and essence of the performing subject. In digital theatre, the application of digital technology extends beyond mere technical support, such as stage design and sound and lighting effects, to permeate the performing subject itself. Through human-machine hybrids, virtual characters, and digital reenactments, a new type of performing entity is created (Binwu, 2022). This entity can be a product of the amalgamation of humans and mechanical devices or chemical components (Cyborgs), entirely virtual characters constructed by virtual imaging technology (Virtual Avatars), or digital replicas or extensions of real performers.

In this process, the performing subject undergoes a transformation from a natural human to a posthuman entity. This shift signifies not merely a technological revolution but also a reinterpretation of the very essence of performing arts. The concept of the posthuman does not aim to transcend the essence of humanity but rather emphasizes a profound reflection and reassessment of human identity and behavior against the backdrop of the ever-advancing technological environment. Posthuman is a profound philosophical and cultural theoretical concept that challenges our traditional notions of the place of humans in the world. Rather than seeing humans as the center of the universe, this theory views them as part of a vast posthuman focus on how human essence, identity, and future are consequently transforme (Jinming, 2023).

Specifically, posthuman explores how technology impacts our lifestyles and delves deeply into how we need to redefine human rationality, consciousness, individual self, and the body, as well as the relationship between humans and other beings, machines, and intelligent systems (Boiko & Iudova-Romanova, 2023). It emphasizes continuity and interactivity, positing that humans are not isolated entities but rather interact and depend on other entities in their environment. From this perspective, posthumanism seeks to transcend traditional binary oppositions such as human vs. machine, and natural vs. artificial, urging us to understand the complex world from a more integrated and holistic viewpoint (Simpson, 2021). Through this fresh perspective, posthumanism calls us to reexamine and rethink the roles and responsibilities of humans in this constantly changing and intricately interconnected world.

In digital theatre, the emergence of the posthuman as the performing subject breaks the traditional boundaries between humans and machines. Performers are no longer merely physical beings but can be digital, programmable, and dynamically changing entities. This transformation significantly enhances the expressiveness and potential of performing arts, enabling performers to transcend physical limitations and present unprecedented artistic creations (Lennox, 2022). Digital theatre, with the posthuman as its performing subject, is not only a product of technological development but also a frontier of cultural and artistic innovation. It drives innovation in the performing subject through technology, paving new horizons for the forms and aesthetic experiences of theatrical arts (Montagud & 2020).

By delving into the project's creative background, technological implementation, and artistic expression, the study explores how digital technology reshapes the subject of dramatic performance and its impact on the traditional forms and artistic values of dramatic arts (Siyuan, 2022). Through the case study of Digital Mei Lanfang, the article aims to provide an in-depth perspective on how digital technology expands and opens the boundaries of Chinese theatrical art creation. By examining the transformation of performing subjects in digital theatre through the lens of Digital Mei Lanfang the article

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seeks to unveil the underlying dynamics and mechanisms of the amalgamation of digital technology and dramatic arts (Bonds, 2019). It provides a profound understanding of the potential developmental trends in the transformation of Chinese digital theatre's performing subjects, extends the boundaries of dramatic artistic expression, and offers theoretical foundations and practical references for the future development of theatrical arts, thereby promoting the further evolution of Chinese theatrical arts in the digital era without losing their inherent characteristics.

However, this research also has its limitations. Firstly, Digital Mei Lanfang is a representative case and provides valuable practical and theoretical insights, but it does not comprehensively understand the complexity of the entire field of digital theatre's performing subjects. Secondly, as both digital technology and dramatic arts are rapidly evolving, this paper cannot encompass all emerging technological applications and artistic practices. Moreover, the discussions on the integration of technology and arts, as well as cultural impacts, are also limited by the available research materials and observational data.

Overall, this article attempts to provide a certain depth of analysis and insight into the intersection of digital technology and dramatic arts under the existing research and resource conditions (Sullivan, 2023). It also anticipates that future research can further expand on the depth and breadth of this research, offering a more comprehensive understanding and evaluation of the impact of digital technology on theatrical arts.

Methodology

To thoroughly examine how digital technology facilitates the transformation of Chinese digital theatre's performing subjects into posthumans, this study employs qualitative research methods, integrating the interplay of dramatic arts and digital technology through an extensive literature review, case analysis, and other research techniques. Initially, through a comprehensive literature review, the author meticulously organizes the existing research findings on the impact of digital technology on traditional Chinese theatre, establishing the theoretical framework and research direction for this research. Subsequently, the author selects the Digital Mei Lanfang project as a representative case study.

Literature Review

The Digital Mei Lanfang Master Reproduction Project

With the continuous emergence of new technologies, art, and technology, once perceived as unrelated parallel lines, are now inspiring each other in innovation and breakthroughs, demonstrating a new trend of integration. Standing at the crossroads of technology and art, the rapid development of digital technology is not only changing every aspect of our daily lives but also profoundly impacting various artistic fields, especially the realm of theatrical arts. Influenced by the political, economic, and technological environments, digital theatre has emerged as a new art form, evolving from initial technological experiments to today's highly interactive and immersive experiences, reaching new heights of innovation (Yajiao, 2023).

Currently, China is actively promoting the application of digital technology in the field of theatrical arts. This initiative aims to drive the innovative development of culture and arts and enhance the market competitiveness of the cultural industry. To achieve this goal, the Chinese government has implemented a series of policies and measures at multiple levels, aimed at fostering a deep integration of digital technology and theatrical arts and nurturing emerging cultural consumption patterns and business

models. At the national strategic level, the 14th Five-Year Plan explicitly highlights the importance of accelerating digital development and emphasizes the necessity of promoting the integration of culture and technology at the national level (Qingyue, 2021). The government particularly supports the combination of the cultural and artistic fields with cutting-edge technologies such as the internet, artificial intelligence, and virtual reality, aiming to encourage innovative practices and the development of new products. Moreover, to accelerate this transformation, relevant departments such as the Ministry of Culture and Tourism are promoting digital transformation strategies, proposing a series of specific measures such as the construction of digital cultural industry parks and support for digital creative projects.

These policies and measures not only reflect the Chinese government's firm determination to promote cultural and artistic innovation and the upgrading of the cultural industry but also provide solid policy support and broad practical space for the deep integration of digital technology and theatrical arts, opening up new possibilities for the future development of culture and arts.

On October 28, 2021, an epoch-making project was officially launched at the Beijing Mei Lanfang Grand Theatre — the Digital Mei Lanfang Master Reproduction Project. This project was initiated jointly by the Central Academy of Drama and Beijing Institute of Technology, funded by the Beijing University Advanced Young Scientist Program, and overseen and artistically supervised by the Center for High-Level Digitalization of Traditional Theatres at the Central Academy of Drama. A team of experts from the Beijing Institute of Technology provided key technological support in optoelectronic imaging, digital performance, and creative simulation for the project (Du Yihang, 2022) In addition, Tencent Group, the Institute of Automation of the Chinese Academy of Sciences, the Central Academy of Fine Arts, as well as the family and disciples of Mr. Mei Lanfang, also offered significant support to the project. The core goal of the project is to use high-fidelity real-time digital human technology to reproduce the Peking Opera master, Mr. Mei Lanfang, creating the Digital Mei Lanfang that closely resembles a real human in appearance, physique, voice, and performance. This marks the birth of the first truly interactive Digital Peking Opera Artist in China and heralds the beginning of a Chinese Figures digital asset library built around this mode (Yujia, 2021).

This groundbreaking project not only showcases the deep application of digital technology in theatrical arts but also embodies the modern inheritance and innovation of cultural heritage. By recreating the elegance of traditional artistic masters through high-tech means, the Digital Mei Lanfang project not only paves a new development path for traditional theatrical arts but also provides valuable practical experience and a model for the integration of digital technology and theatrical arts.

Peking Opera, a jewel in the crown of Chinese traditional theatrical arts, boasts a history of over two hundred years and stands as one of the most representative elements of China's cultural heritage. With its unique form of performance art that integrates singing, dialogue, acting, dance, and martial arts, Peking Opera holds a significant position on the global stage of performing arts. The distinctive facial makeup, costumes, and role categorization system of Peking Opera, along with its unique musical and performance styles, not only embody the profound cultural depth of China but also showcase the exquisite craftsmanship and profound meaning of the art. Moreover, Mei Lanfang, revered as a grandmaster in the history of Peking Opera and Chinese theatre, is an undeniable symbol of Chinese culture and enjoys an esteemed status. His pioneering contributions to Peking Opera performance art, particularly in portraying female roles (dan roles), and his efforts in taking Peking Opera to the international stage have established it as a world-class cultural and artistic heritage. Today, Mei Lanfang's artistic legacy and spirit remain a precious treasure of Chinese theatrical art. However, with the prevalence of a fast-paced lifestyle and diversification of cultural consumption patterns, traditional Peking Opera faces certain challenges in meeting the aesthetic and consumption needs of modern audiences. This situation has led to an aging audience demographic and a lack of appeal to the younger generation, posing challenges to the inheritance and future development of Peking Opera.

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Against the backdrop of rapid advancements in cutting-edge technologies like virtual reality, cloud computing, and artificial intelligence, exploring how to utilize these technologies to rejuvenate and invigorate traditional Chinese cultural heritage such as Peking Opera has become a key responsibility and mission for contemporary artists. In traditional theatrical creation, the human (natural human) is the center of creation and perception, while digital human (posthuman) technology offers a unique perspective, ingeniously integrating human artistic expression with technological innovation (Crellin & Harris, 2021). The Digital Mei Lanfang project aims to precisely reproduce Master Mei Lanfang's artistic image and performance essence in multiple dimensions such as voice, appearance, spirit, and rhythm. This not only revives the grandeur of a grandmaster but also provides innovative pathways for the interpretation and dissemination of Peking opera. This form of cultural inheritance and innovation through digital technology not only helps to promote and preserve traditional cultural arts but also injects new vitality into them, offering human-machine collaborative solutions for the high-level inheritance of traditional theatre.

Professor Zhong Chengxiang from the Central Academy of Drama said at the launch ceremony of the Digital Mei Lanfang Master Reproduction Project: Peking Opera is the quintessence of our nation, an essential part of China's excellent traditional culture, and Master Mei Lanfang is the most outstanding representative of Peking Opera art. Today, we stand at a new era's height, cherishing the classics and the master, mobilizing modern technological means to reproduce the master's elegance, better inheriting the master's excellent traditional personality spirit, making the master's legacy compatible with contemporary culture, harmonious with modern society, and striving to achieve creative transformation and innovative development. This is an endeavor of great significance and practical relevance in our time.

The revival of Mei Lanfang in such a vivid digital form marks a profound integration of traditional art with modern technology, not only carving new pathways for the inheritance and innovation of traditional opera art but also unprecedentedly expanding the essence of performing arts. In this project, high-precision digital technology meticulously reconstructs and reproduces Master Mei Lanfang's artistic image across multiple dimensions such as voice, body language, and emotional expression. This endeavor serves not only as a tribute to Master Mei Lanfang's artistry but also as an innovative practice for the traditional art form of Peking Opera. Moreover, in the performances of Digital Mei Lanfang audiences are no longer confined by the constraints of time and space, allowing them to experience the charm of Peking Opera on a broader scale. This technology-enhanced performing subject elevates the dissemination and reception of opera art to new heights, enabling traditional culture to transcend geographical boundaries and reach a global audience. It also provides the younger generation with a fresh perspective to understand and appreciate traditional arts, igniting their interest and love for traditional culture.

On a deeper level, the Digital Mei Lanfang project also sparks profound contemplation on the relationship between human art and technology. It represents not merely an extension of artistic forms through technological means but also a reshaping of the concept of the performing subject. In this process, the boundaries between technology and art gradually blur, further broadening the possibilities of performing arts and offering artists new perspectives to explore the essence of human art and its future direction.

Results and Discussion

Use of Technology in the Digital Mei Lanfang Project

In the innovative development of modern theatrical arts, the Digital Mei Lanfang project is not just an homage to traditional Peking Opera but also an exemplary representation of the fusion of technology and art. Through advanced technological means and profound artistic insight, the project ingeniously combines Master Mei Lanfang's artistic persona with modern technology, inaugurating a new



chapter for traditional theatrical arts in the digital era.

The project, centering around a twin digital human solution based on visual measurements and using digital human production technology as its core, creates a highly realistic digital character, Digital Mei Lanfang. With the support of virtual digital human technology, the creative team conducted extensive research on historical materials and consulted industry experts to finalize the reproduction of Mei Lanfang at the age of 26, considered to be in the golden period of his artistic career. In the early stages of the project, the lack of high-definition photography in the 1920s, low-resolution photos, the absence of video materials capturing Mei Lanfang's daily life, and the scarcity of performance videos added immense challenges to reproducing Master Mei Lanfang's persona. Unable to gather real three-dimensional data sources for Mr. Mei Lanfang, the team devised a new solution. They collected a large number of old photos of Mei Lanfang, meticulously analyzed and compared facial details, and then invited Professor Zhang Wei from the Central Academy of Fine Arts to create a 1:1 sculpture of Mei Lanfang's expressionless head based on the photographs (Yuhan, 2021).

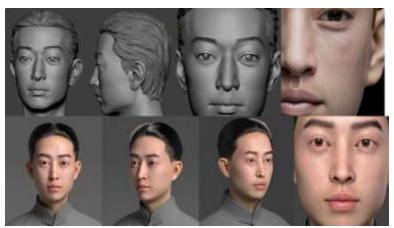


Figure 1: The high-precision laser scanner obtained Mei Lanfang's basic expressions.

Subsequently, the lab set up a massive spherical device—a black framework interwoven into a sphere, with a chair positioned inside. Serving as a light field capture system for capturing threedimensional expressions, the setup consisted of 36 cameras and 162 sets of controllable LED lights, boasting millimeter-level precision. Through scanning the Mr Mei Lanfang sculpture, a model was constructed. High-precision laser scanners were used to scan the statue, acquiring the basic facial structure of Mr Mei Lanfang. However, reproducing a vivid 'Mei Lanfang' required authentic physiological data. The data differ significantly with and without makeup, and capturing the data of the master performing roles was even more challenging. As the cultural expression in the artist's gaze is the essence of Peking Opera performance, the team, after considerable effort, invited Mei College disciples who embody Mr. Mei's artistic spirit to complete the data entry (Kelley & Tornatzky, 2019). Combining this with Mei Lanfang's performance materials, they meticulously crafted every frown and smile. The team also used meta computing capture technology to capture the details of human skin, created normal maps based on old photos, and used spherical computing principles to precisely reproduce pore-level skin texture details. Finally, based on physiological principles, they restored the real skin effects of the character. After continuously refining the static model to match historical photos, they constructed highfidelity costumes based on real three-dimensional tailoring, using preserved fabric patterns from the Republic of China era to create realistic costume material simulations. Ultimately, they successfully created the Digital Twin of Mei Lanfang.



Figure 2: Expression Capture Lab

The Digital Mei Lanfang project not only recreated the master's classic artistry and genuinely reflected his artistic style but also has emblematic significance in embodying the posthuman as the performing subject. By utilizing cutting-edge 3D modeling and facial capture technology, the project precisely reproduced the master's performance details, transcending the physical and physiological limitations of human performers. Furthermore, the digitalized Mei Lanfang can be presented on various digital platforms, thereby breaking the time and space constraints of traditional performances and offering audiences a novel, beyond-traditional-performance-space artistic experience. This innovative endeavor undoubtedly provides valuable experience and insights for the digital transformation of traditional arts.

The Posthuman Transformation of the Performing Subject

The renowned French author Gustave Flaubert once said, "The further we progress, the more scientific art must become and the more artistic science must become. They part ways at the foot of the mountain only to meet again at the summit." Since the mid-18th century, every technological revolution has given birth to new media forms and artistic modalities, propelling the innovation and development of artistic expression. Initially, the mechanical technological revolution brought the mechanical camera, laying the technical foundation for the art of photography. During this period, people were able for the first time to capture and preserve instant images, providing a new visual medium for artistic creation. This was closely followed by the electric technological revolution, which introduced electrically powered cameras and projectors, giving birth to the art of cinema (Jansen, Leeuwenkamp, & Urricelqui, 2021). At this stage, the emergence of dynamic images greatly enriched the forms of artistic expression, offering a new platform for narrative and visual arts.

Entering the early 20th century, the electronic technological revolution made the arts of broadcasting and television possible. With this technology, dynamic image arts not only became real-time but also, through broadcasting and television media, live performing arts could transcend spatial limitations and be transmitted in real time to millions of households. By the mid-20th century, the advent of the information technology revolution marked the beginning of a new era. Shannon's information theory and Turing's computer theory became significant hallmarks of this period, endowing dynamic real-time image arts with interactivity. During this period, theatrical arts underwent significant transformation and innovation. The model of "technology + theatre" emerged in various forms, making theatrical arts not just performances on stage but also a multidimensional, highly interactive composite art form. The development of digital theatre is both a journey of technological innovation and a testament to the continuous evolution of artistic expression methods.

Within the realm of digital theatre, the concept of posthuman marks not only a new era of fusion between performing arts and technology but also reveals a novel form of performance that transcends the capabilities and identity of traditional human performers. The essence of this concept lies in reshaping and presenting artistic works through advanced technological means—including but not limited to

artificial intelligence, virtual reality, and motion capture technology (Wilde, 2020). In particular, the Digital Mei Lanfang project exemplifies the concrete practice and manifestation of this concept.

The creation and performance of Digital Mei Lanfang are not merely a digital replication of Mr. Mei Lanfang's traditional Peking Opera art; they represent the tangible embodiment of the posthuman concept of artistic performance in the real world. Through precise technological application, Mei Lanfang's unique performing arts transcend the constraints of time and space, allowing for their perpetual preservation and reproduction. In this process, technology not only successfully captures and reproduces the external form of the performing arts but, more importantly, it captures the essence and emotional expression of the artist's performance. This makes the digitalized performance a new form of art, offering new possibilities for the inheritance and development of traditional arts. Moreover, the Digital Mei Lanfang project explores new types of interaction between art and the audience. In this era of posthuman artistic performance, audiences are no longer passive receivers but can connect with the performance through interactive means, enjoying a more immersive and personalized artistic experience. This new form of artistic experience not only expands the boundaries of art but also makes art itself more vivid and influential.

Unperceived, the performing subject has evolved from the traditional natural human to the posthuman influenced by digital technology, representing a form of the subject with its spontaneous dynamism and a self-consistent logical system, transcending the traditional confines of theatrical performance. The application of digital technology enables artists to experiment with different performing subjects to explore new digital theatre forms, surpassing physical limitations. Besides the case study of Digital Mei Lanfang, the presence of posthumans is also evident on the international stage.

For instance, the concerts of Hatsune Miku, a virtual synthesized performer, are typical shows featuring a virtual persona as the performing subject. Hatsune Miku, a virtual singer based on Vocaloid voice synthesis technology, is entirely computer-generated, including her image and voice. During concerts, Hatsune Miku's 3D animated figure is presented on stage through advanced holographic projection technology, synchronized with live music. This performance form, merging animation, music, and cutting-edge projection technology, creates a unique immersive experience for the audience. The success of the virtual idol Hatsune Miku reflects the tremendous potential of posthuman performing subjects in enhancing the audience experience. Her concerts, integrating advanced 3D projection and dynamic rendering technologies, allow a virtual performer to "come to life" on stage and interact with the live audience. This innovative form of performance and audience experience not only expands the boundaries of performing arts but also, to some extent, alters the audience's perception and reception of art.

The *Fly AI* installation by Belgian artist David Bowen, centered around a Digital Puppet, presents a unique artistic creation that demonstrates the fusion of art and technology. This device utilizes the TensorFlow machine learning image recognition library to classify images of live flies. As flies fly and land in front of the camera, their images are captured and classified by the image recognition software, generating a ranked list of possible items. If Fly ranks first on the list, a pump provides water and nutrients to the fly population based on the percentage of the ranking. If the Fly does not rank first, water and nutrients are not provided. The system is set to run indefinitely, with uncertain outcomes. *Fly AI* explores the interaction between the natural world and artificial intelligence by combining living organisms with AI software. This innovative form of art not only challenges traditional concepts of art but also raises ethical and philosophical questions about the application of AI in the real world. Through this work, Bowen demonstrates how technology can interact with elements of the natural world, prompting audiences to deeply contemplate the relationships among technology, art, and ecology.

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The transformation of the performing subject in digital theatre to posthumans undoubtedly has revolutionary impacts on artists, audiences, and the entire cultural industry (Roelvink & Zolkos, 2020) For artists, this signifies not only an expansion of creative means and diversification of artistic expression but also further ignites their creative inspiration and desire to express. For audiences, this transformation significantly enriches cultural experiences in terms of dimensions and notably enhances participation and interactivity, thereby deepening their engagement and experience with cultural content.

The transformation of the performing subject in digital theatre to posthumans has undeniably brought revolutionary impacts on artists, audiences, and the entire cultural industry. For artists, it signifies not only an expansion of creative means and diversification of artistic expression but also further ignites their inspiration and desire to express. For audiences, this transformation significantly enriches cultural experiences in terms of dimensions, and notably enhances participation and interactivity, thereby deepening their engagement and experience with cultural content.

Moreover, looking at the entire cultural industry, the emergence of posthuman performing subjects not only promotes the expansion of the theatrical arts market and the transformation of economic models but also fosters a deep integration of technology and art, as well as cross-industry innovative collaborations, facilitating the development of cultural diversity and inclusiveness. This shift is epochal, reshaping the ways art is created, presented, and enjoyed, while also posing new considerations for artists: in this era brimming with possibilities, how should we better utilize these technologies to empower the cultural industry while ensuring the core values of art are preserved and passed on? This is a topic that requires the collective involvement and deep contemplation of artists, audiences, industry experts, and policymakers. As posthumans continue to evolve in theatre, their impact on art, culture, and society at large will become even more significant, sparking discussions and explorations that are increasingly profound and extensive (Binwu, 2022).

Conclusion

Throughout history, each technological revolution has spurred the innovative development of stage arts. The mechanical technological revolution introduced innovations in rigging, curtains, and stage settings; the electric technological revolution brought about the creation of stage lighting scenes; the electronic technological revolution revolutionized stage sound systems and introduced control technologies for lighting, sound, and machinery. The ongoing information and intelligent technology revolution is selecting new "performers" for stage arts. As technology continually advances and artistic forms innovate, the epochal transformation represented by posthumans as performing subjects is not just a leap in the field of art but also a microcosm of human cultural and societal progression. In this process, artists, audiences, and every participant in the cultural industry are crucial drivers and witnesses. It is hoped that, amidst this transformative wave, we will not only continue to explore the boundless possibilities of art but also deeply contemplate the accompanying ethical, legal, and societal issues, jointly promoting the construction of a more diverse, inclusive, and vibrant cultural ecosystem.

In the future, the journey of posthumans as performing subjects in digital theatre will continue, constantly challenging our imaginations, stimulating the creativity of artists, and guiding us into a more richly varied world of art. Let us all look forward to and participate in this thrilling epochal evolution, embracing the new chapter of the fusion of art and technology with an open mind and courageous steps.

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