

The Evolution of Digital Drama in the Context of Cultural Virtualization

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ABSTRACT

This study systematically discusses the evolution of digital drama under the background of cultural virtualization. By defining the concept and formation mechanism of cultural virtualization, this paper analyzes the influence of virtualization background on drama art, and establishes a classification framework of digital drama, focusing on limited interaction, oral narration, coexistence and digital technology. This paper traces back from the early development of online drama and multimedia experience to the digital age, the rise of immersive drama on the virtual reality stage, and then to the development of artificial intelligence and generative drama in the intelligent interaction stage, revealing the profound transformation of drama form, from physical coexistence to virtual interaction, driven by technology. This research enriches the theoretical system of digital humanities and performing arts, provides practical reference for cultural heritage protection and public art innovation, and emphasizes the necessity of strengthening interdisciplinary cooperation and moral standards to promote its sustainable development in the meta-cosmic era.

Keywords: Cultural Virtualization, Digital Theater, Evolutionary Process, Virtual Reality, Artificial Intelligence Generation.

1. INTRODUCTION

1.1 Research Background

Under the background of cultural virtualization, digital technology has profoundly changed the way we produce and consume culture, and digital drama has appeared and continues to develop. With the maturity of virtual reality and metacosmic technology, traditional drama has gone beyond the physical limit and turned to an immersive and interactive virtual performance form, and the audience experience has changed from passive viewing to active participation. Relevant empirical research confirms that the perceived distance and subjective experience in meta-performing arts directly affect the audience's immersion, and the application of virtual reality in drama accelerates the transformation from media simulation to cultural embedding^{[1][2]}. In the post-pandemic era, the acceleration of cultural digitalization and the rise of global digital humanities research provide a realistic basis and theoretical reference for this research, highlighting the academic necessity of exploring the evolution of digital drama. This evolution not only reflects the empowerment of technology to art, but also reflects the reconstruction of human aesthetic paradigm under cultural virtualization.

1.2 Significance of the Research

Under the background of cultural virtualization, digital drama can enrich the interdisciplinary literature of digital humanities and performance research, and fill the deficiency of systematic analysis of the evolution of drama form based on technology in existing research^{[1][2]}. In practice, the research results can guide drama creators to effectively integrate virtual technology, enhance the international competitiveness of Chinese immersive drama, and provide scientific basis for the virtual protection of cultural heritage, the digitalization of public cultural services, and art education in the metaverse era. In the context of globalization and digitalization, this study helps to enhance the country's cultural soft power, promote the inclusive development of art and the realization of social and cultural values, and has significant academic value and application prospects.

2. THE INHERENT CHARACTERISTICS OF CULTURAL VIRTUALIZATION AND THE THEORETICAL FOUNDATION OF DIGITAL DRAMA

2.1 Definition and Formation Mechanism of Cultural Virtualization

Cultural virtualization refers to the systematic migration of human reality and cultural forms from physical space to virtual space, with information and communication technologies (ICTs) as the core intermediary. This concept emphasizes the digital reconstruction of cultural production, dissemination and experience, breaking the limitations of traditional physical boundaries, and enabling cultural elements to achieve twinning and reshaping in the virtual environment. The formation mechanism (figure 1) mainly stems from the continuous iteration of digital technology, the popularization of global Internet infrastructure and the deep application of immersive technologies such as virtual reality, augmented reality, and metaverse platforms. These elements jointly drive the transformation of culture from material carriers to data flow and interactive environments^[3]. Under the action of this mechanism, cultural virtualization not only reshapes human perception and social interaction, but also lays the technological context foundation for the birth of new art forms, prompting traditional art forms such as drama to accelerate their evolution towards virtual integration.

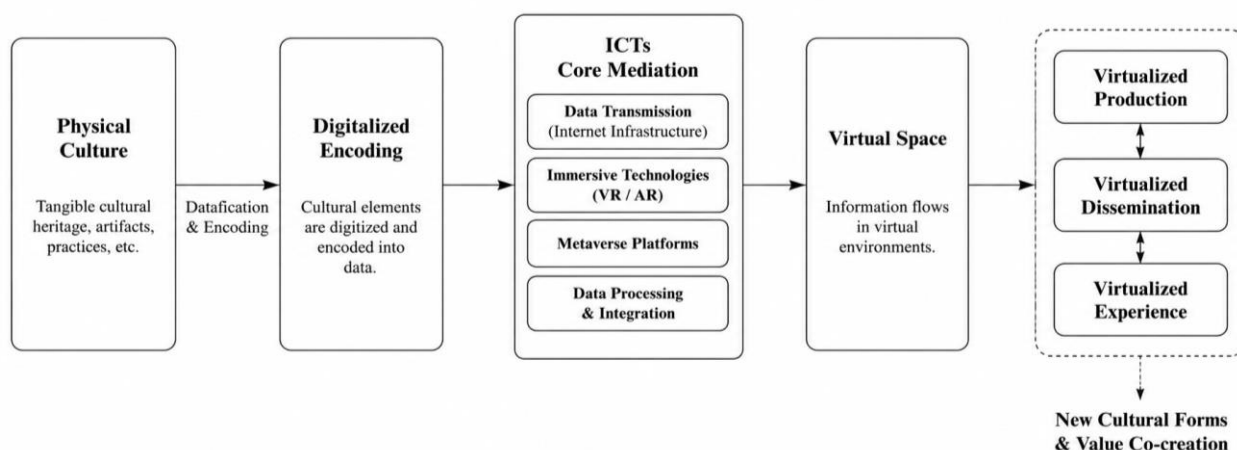


Figure 1. The formation mechanism of cultural virtualization.

2.2 Analysis of the Impact of Virtualized Context on Dramatic Arts

The virtual context has profoundly reconstructed the presentation logic of theatrical art and the mode of audience participation. The physical coexistence and the “four walls” on which traditional cinemas depend have been broken in the virtual environment, forming a new frontier of the “fifth wall”, that is, the intermediary layer between digital interface design and user experience, which leads to fundamental changes in the immediacy, physicality and emotional resonance of performances^[4]. More specifically, Metaverse and virtual reality technology expand the theater from a fixed scene to a shared virtual space. The audience can realize a more interactive experience by perceiving distance and subjective immersion, but at the same time, it challenges the live authenticity and collective ceremony of traditional drama. This influence not only reflects the empowerment of technology to artistic expression, but also promotes the development of drama to mixed reality and generative innovation, and also leads to in-depth thinking on performance ethics, cultural values and audience subjectivity, which provides a key analytical dimension for the sustainable development of drama art in the digital age.

2.3 Core Concepts and Classification Framework of Digital Drama

The core concept of digital drama can be defined as the real-time performance form of mixing live performers and digital media. Its definition must meet four necessary conditions: limited interaction, the existence of oral or narrative content, the physical or virtual coexistence of performers and audiences, and the central position of digital technology in the creative process^[5]. Based on this concept, we can organize digital drama into several forms: early multimedia experiment, remote network interaction form, immersion form in virtual reality, and generation form using artificial intelligence. Each form shows different degrees of technical integration and public participation. This classification framework is helpful to clearly understand how digital drama has evolved from traditional scenes to cultural virtual worlds. It also provides a useful

benchmark for theory and creation, and shows the unique aesthetic value and numerous performance possibilities of digital drama as a virtual cultural product.

3. THE EVOLUTION AND PRACTICE OF DIGITAL THEATER IN THE CONTEXT OF CULTURAL VIRTUALIZATION

3.1 Early Digital Era: Online Drama and Multimedia Experiments

In the early stage of digitalization (from 1990s to early 2010s), online drama and multimedia experience became the starting point of the development of digital drama. Under the background of cultural virtualization, the popularity of Internet and video technology makes drama begin to leave the physical stage and turn to virtual media. Artists began to explore mixed forms, such as real-time network transmission, projection mapping and multimedia superposition. These experiments have broken the boundaries of traditional theaters, and enabled the performances to be shared remotely and reconstructed interactively through digital platforms. The research shows that video and internet, as the main media types of drama, are initially characterized by expanding narrative with the help of technology and limited public participation, which lays the foundation for subsequent virtual integration^[6]. Although physical actors and live elements were still used in practice at that time, they had demonstrated the prototype of transforming cultural production into data stream and virtual space, which provided technical prototype and aesthetic exploration way for the systematic development of digital drama.



Figure 2. Example of an early digital multimedia drama setup: *The Double Set*.

Under the background of cultural virtualization, the early multimedia digital experience, through the deep integration of video technology and live performance, began to change the form of drama, from physical scenes to virtual expressions. Take Studio Azzurro's "The Double Set" as an example^[9]. This work (Figure 2) creates a multi-layer virtual image space through the interaction of large projection screen, complex lighting system and actor's body. This makes the performance go beyond the boundaries of traditional drama and realize the virtual extension of audience perception. This practice marks the technical path of early exploration of digital drama and lays the foundation for the future development of immersive and generative drama.

3.2 The Virtual Reality Stage: The Rise of Immersive Theater

In the era of virtual reality (from the mid-2010s to the present), the immersive cinema appeared with the development of VR/AR technology. This shows that digital cinema is becoming more and more virtual. Through cultural virtualization, headphones and 360-degree environment completely immerse the audience in the virtual stage. The "coexistence" of the program changed from physical space to shared virtual world. Real-time interaction and sensory simulation have been greatly improved. Research shows that the development of online co-existence meta-drama has changed the concept of life, through perceptual distance and subjective experience. The audience is no longer just a viewer, but an active participant in the virtual environment^[7]. This rise has not only solved the physical gathering restrictions in the post-

pandemic era, but also deepened the immersive aesthetics and emotional transmission efficiency of theatrical art, promoted the evolution of virtual reality from an auxiliary tool to a core creative medium, and reflected the paradigm upgrade of theatrical experience in the context of cultural virtualization.



Figure 3. Example of an immersive 360-degree theatrical performance: Peter Pan 360 (Threesixty Entertainment, designed by William Dudley).

In the context of cultural virtualization, immersive theater has achieved a leapfrog transformation from physical space to virtual experience through the organic combination of large-scale 360-degree projection and live performance. Taking Peter Pan 360 produced by Threesixty Entertainment as an example^[10], the work was designed by William Dudley (figure 3). Through the circular theater and high-precision panoramic imaging technology, it breaks the fourth wall of the traditional stage, allowing the audience to gain an immersive experience in the shared virtual London cityscape. This practice marks a key node in the evolution of digital theater from early multimedia experiments to a deep virtualized form, laying the technical and aesthetic foundation for the subsequent development of virtual reality and generative theater.

3.3 Intelligent Interaction Stage: The Development of Artificial Intelligence and Generative Drama

In the intelligent interaction stage (since the 2020s), artificial intelligence and generative technology have driven digital drama into a period of dynamic innovation. In the context of cultural virtualization, machine learning, generative adversarial networks and large language models enable the real-time generation and personalized interaction of drama scripts, character behaviors and narrative paths, and performances have evolved from pre-set to adaptive. The development and innovation path of immersive drama in China shows that the integration of digital media technology and artificial intelligence is reshaping the connotation of “immersion”, extending from the five senses experience to intelligent co-creation^[8]. Generative drama in this stage not only improves the efficiency of creation and the degree of audience customization, but also triggers a profound discussion on algorithm ethics, artistic originality and the boundaries of human-computer collaboration, marking the maturity of digital drama in the virtual cultural ecosystem and the expansion of future possibilities.



Figure 4. Example of metaverse generative performance in the intelligent interaction stage: Kamilia Kard's "Toxic Garden-Dance Dance" Dance (Source: <https://not.neroeditions.com/ballare-nel-metaverso/>).

Under the background of cultural virtualization, the intelligent integration stage centered on artificial intelligence and generation technology is pushing digital cinema to change from predefined format to real-time dynamic generation. Toxic Garden-Dance Dance created by Kamilia Kard is created on Roblox platform. Taking "Dance" as an example (Figure 4), this work realizes the deep co-creation between the public and the virtual space through the virtual avatar and real-time interactive environment, and shows the potential of meta-platform as a support for drama generation^[11]. This practice marks that digital cinema has entered a new stage of intelligent integration, which provides an important reference for future performance forms driven by artificial intelligence.

4. CONCLUSION

Under the background of cultural virtualization, this study systematically reviews the development of digital cinema. Firstly, by defining the concept and formation mechanism of cultural virtualization, this paper analyzes the influence of virtualization background on drama art, and establishes a classification framework of digital theater with limited interaction, verbal narration, coexistence and digital technology as the core. This provides a solid theoretical basis for the follow-up research. Next, this paper traces back from the early development of online cinema and multimedia experience to the digital age, until the rise of immersive cinema on the virtual reality stage, and then to the development of artificial intelligence and generative cinema in the intelligent interaction stage. It reveals the profound transformation of drama form from physical coexistence to technology-driven virtual interaction, and shows the evolutionary path of the integration of art and technology.

However, this study still has some limitations, such as the lack of sufficient empirical case studies of the latest generation technology and the influence of regional cultural differences. Looking into the future, digital cinema will continue to develop through the deep integration of metauniverse and artificial intelligence. It is recommended to strengthen interdisciplinary collaboration and ethical research to promote its sustainable development and inclusive value realization in the global process of cultural virtualization, and to provide continuous impetus for the digital protection of cultural heritage and the innovation of public art.

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