Postprint: An Investigation into the Interactive Experience of Digital Film and Television in Virtual Reality Technology

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Abstract

In recent years, virtual reality (VR) has developed rapidly, with continuous breakthroughs in key technologies. VR films, which have emerged from the digital film and television industry, have become a new language. In addition to the immersive and engaging experiences that virtual reality brings to audiences, it also allows audiences to participate and interact within the narrative, granting broader creative space for artistic expression that was originally based on audio-visual synthesis as its object of appreciation. Its unique form and narrative mode may also bring disruptive changes to the development of the film and television industry, making exploratory contributions. This paper takes the unique image forms and narrative modes formed under VR technology as its entry point to examine the changes in audience viewing experiences and how VR film and television should be redefined, and to analyze the possibilities for future development of film and television.

Full Text

An Exploration of Interactive Experiences in Digital Film and Television Under Virtual Reality Technology

Abstract: In recent years, virtual reality (VR) has developed rapidly, with key technological breakthroughs emerging continuously. VR cinema, as an evolution within the digital film and television industry, has become a new language. Beyond the immersive and engaging experiences that VR offers audiences, it enables interactive participation within narratives, expanding the creative space for an art form traditionally centered on audiovisual synthesis. Its unique morphology and narrative forms may contribute disruptively to the film industry' s development, making exploratory contributions. This article examines the distinctive image morphology and narrative modes shaped by VR technology to

observe changes in audience viewing experiences and how VR cinema might be redefined, analyzing possibilities for future film and television development.

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The Sundance Film Festival, one of the world' s most avant-garde film festivals, first featured VR films in 2012. At that time, Nonny de la Peña from the USC Annenberg School for Communication and Journalism presented *Hunger in Los Angeles*, a short film shot using an Oculus VR prototype that addressed food insecurity in Los Angeles. Except for a brief absence of VR films at Sundance in 2013, the number of VR films has multiplied several times in subsequent years, becoming the biggest star of the New Frontier section. In recent years, major festivals including Cannes, Venice, Tribeca, and the Beijing International Film Festival have all established VR cinema exhibition units, providing a platform to showcase how virtual reality technology might revolutionize film creation, offering audiences a new dimension of experience and transforming them from passive observers into active participants.

1.1 Traditional Image Transmission Methods

The "traditional" referred to here is defined relative to the pre-VR era. From a physical spatial dimension, whether 2D or 3D cinema, image transmission has been difficult to break free from screen boundary constraints, which we term "framed vision." The "frame" represents the information perception zone that directors provide to audiences. Aspect ratios have evolved from the traditional 4:3 to the ultra-widescreen 2.35:1, all in pursuit of broader vision and grander scenes. Based on this specific two-dimensional frame, filmmakers employ audio-visual language— "viewpoint," "shot scale," "staging," "sound," and "movement" —to convey narrative through unidirectional transmission, aiming to provide audiences with an immersive viewing experience. Audiences select appropriate viewing distances to receive audiovisual content and gain new perceptions. This constitutes the expressive form of traditional image art.

1.2 Image Expression Under VR Technology

With the development of VR technology, a new relationship has emerged between contemporary film technology and art: "Because of technology, there is art." The application of VR technology blurs the relationship between reality and virtuality, thereby transforming image generation and composition methods. Continuously innovative technology provides vast creative space and intellectual stimulation for art, ultimately making art a form armed with technology. VR'

s characteristics of immersion and participation have created new multimedia information display methods that simulate and generate digital images of three-dimensional real or virtual environments and characters, combined with sound effects and physical feedback to transmit information to audiences. This constitutes a real-time interactive three-dimensional image that provides audiences with a 360-degree panoramic space. Furthermore, visual interactivity has become one of the concepts of VR image expression. Compared with traditional film and television forms, VR cinema emphasizes visual impact and full sensory experiences for audiences. Its narrative structure is fragmented, non-linear, and gamified. This allows audiences to independently choose which area to watch within specific shots, breaking conventional single frames to discover more spatial details from different angles and obtain different information feedback and perceptions. This requires directors to better control the overall situation, set up more plot points and elements, and utilize this new fragmented narrative approach.

1.3 The Context of Digital Film and Television Under VR Technology

Film and television, as a general term for cinematic and television arts, are products of the combination of modern science, technology, and art, conveying and expressing through language elements such as images, sound, montage, and storylines. Film and television content includes movies, TV dramas, programs, film and television advertisements, animation, and more. Today, the digital film and television media we face is already a converged medium of television, mobile phones, and the internet. The new domain brought by VR technology has made the dissemination methods of different types of film and television content more intuitive and efficient, better satisfying audience demands that are multi-level, diversified, specialized, and personalized. Throughout art history, generally speaking, during the initial rise of a medium, what first attracts audiences is novel technology, followed by its content, and VR film and television is no exception. Immersive experience is what audiences pursue in the early stages of this technology, subsequently perceiving audiovisual content and experiencing fresh stories within virtual reality, which places higher demands on content creation. Therefore, based on VR' s medium characteristics of strong immersion and visual interactivity, it is more suitable for leveraging enormous advantages in functional social spaces for education and in physical spaces for 漫游功能 (roaming functions), yet it poses challenges to non-traditional narrative methods and film creation systems under VR technology. Today, the industry is also seeking a new morphological positioning, which we temporarily call "VR cinema."

2. Multi-Modal Presentation and Narrative Forms of VR Films

2.1 Morphological Categories of VR Films

From the interactive dimension of audience viewing experiences, two types can be distinguished. The first is audiovisual immersive experience interaction, where audiences can view various areas within film scenes simply by turning their heads, substituting character viewpoints within a 360-degree panorama. During the experience, audiences can freely explore according to the spatial composition of the images. The image setting proceeds from a human perspective, using real environment simulation as a means to guide viewpoints into the environment, experiencing various environmental changes supplemented by stimulation of human senses, such as sound changes and image changes, providing audiences with a sense of reality that is simultaneously authentic and artificial. Of course, the purpose of immersive VR experience is to create a sensory atmosphere for audiences, using atmosphere to drive audience senses into the narrative. In addition to viewpoint guidance, sound guidance is another method, with both aiming to lock audience viewpoints and promote plot development. This type of VR immersive experience film offers diverse varieties and high freedom of choice. The key to the experience lies in the authenticity of spatial simulation and sound design, which can stimulate audience interest and hobbies, allowing them to actively participate in the film experience, obtain enlightenment in spirit and thought, and continuously improve and perfect themselves.

Another immersive experience combines human-computer interaction with real spatial expression, which we term "standing interactive VR." Audiences not only achieve audiovisual immersion but also ascend to a full sensory experience upgrade. Standing interactive VR relies on real space, utilizing the latest photogrammetry and 3D scanning technologies, combined with documentary techniques, allowing audiences to stay in a specific space created by VR cinema and experience plot changes from the film protagonist' s perspective. This type of standing interactive VR transforms audiences into film protagonists, turning passivity into activity and 深化电影体验 (deepening film experiences). It blends virtual worlds with real scenes, shaping a marvelous space that seems both real and virtual, providing audiences with ultimate experiences.

2.2 Narrative Forms of VR Films

Based on the two morphological expressions described above, examining the narrative logic in VR film creation reveals three forms: multi-linear narrative, guided narrative, and interactive narrative. These narrative methods break traditional film narrative structures and can be used independently or mixed and superimposed to form new narrative forms, providing more possibilities for future VR film narrative methods.

Multi-linear narrative borrows from dual perspectives of male and female pro-

tagonists; choosing different perspectives leads to different plot mainlines. Some audiences, driven by curiosity, while being guided by one perspective also wonder about the other perspective, not satisfied with a single perspective from either protagonist. To satisfy this curiosity, perspective switching can be achieved through guided movement of butterflies or character encounters as switching conditions, allowing audiences to experience the charm brought by different characters. Of course, this perspective experience has the limitation of fragmented plotlines, requiring audiences to make self-adjustments to ensure complete experiences. Multi-linear narrative VR films still follow the narrative flow of "beginning → development → ending," breaking the situation where audiences remain outsiders and placing them within the narrative, changing traditional fixed, single story frameworks and providing audiences with ultimate experiences. The purpose of hooks is to attract audience attention, aiming to bring audience focus back to the main plotline, progressing step by step. If audiences ignore them, hooks will continue to appear until they attract audience attention.

Guided narrative uses plot development as clues to guide audiences to follow the narrative progression. The difference from multi-linear narrative is the absence of character switching, but in interactive VR film experiences, these two methods often coexist to serve the film experience together. Guided narrative also requires audiences to lock their viewpoints within the story; if viewpoints stray, it becomes difficult to find clues, easily causing the entire VR film plot to interrupt or remain stuck at a plot point. In actual experiences, some audiences attempt viewpoint jumping, moving out of a character' s viewpoint, which can easily cause the main plot to pause. Directors, considering complete VR experiences for audiences, use a butterfly or sound as visual hooks to attract audience attention, returning perspectives to protagonists and promoting plot development. This is a film expression method of visual guidance.

Interactive narrative is based on interactive wearable devices, allowing audiences to interact with characters through body language. They can not only understand basic character information but also trigger character plot development settings. It is an interactive experience between audiences and characters. Common interactive narratives include touching, action gestures, etc., providing characters with tactile and visual trigger points so that characters make corresponding reactions, forming a "one-on-one" interactive form that enhances interactive experiences. Different interactive forms also affect plot directions. Interactive forms utilize VR wearable devices to allow audiences to feel deeply immersive experiences. In VR film design, interactive narrative methods always use audience body movements as media to trigger protagonist interactive senses, thereby conducting corresponding film expressions.

3. Audience Identity and Experience in the VR Context

3.1 Dual Identity of "Player" and "Audience"

Exploration of cinema in the VR context continues, and while there is still no clear linguistic formulation, the identity of traditional film audiences has undergone fascinating changes in VR interactive narratives. VR interactive narrative is a method based on the fusion of two viewpoints– "audience" and "player" –placing audiences within film environments to experience and promote film plot development in character form. Some films, for audiences' ultimate experiences, provide diversified plotlines so that audiences can select a plot according to their preferences, lock in an ending, and endow audiences with the ability to create stories and write endings. Of course, this interactive experience cannot do without support from other characters and environmental elements to allow audiences to truly experience the fun of switching between real and virtual dual identities. As the plot progresses and audiences immerse themselves within it, they can not only ask questions to characters in the narrative or conduct corresponding activities but also ensure unity with the plot. This film experience runs through the entire film with the dual identity of "player" and "audience," realizing interaction between film and audience, breaking the traditional situation of mere watching and listening. Instead, audiences become protagonists, promoting plot development through protagonist vision and behavior. In summary, audiences exist as story protagonists, not merely experiencing from a bystander perspective. The interactivity of virtual reality gives audiences more initiative within films to define their own role identities, similar to traditional game players where you become a member of the game to determine the win or loss of the next outcome, yet contrary to traditional film audiences. Audiences are no longer spectators outside the story, which enhances immersion, participation, and curiosity during viewing.

3.2 VR Film Experience Based on Degree of Interaction

The application of interaction in VR film and television is not novel, but how to apply just the right amount of interaction in films for narrative purposes, allowing audiences to gain surprises within good experiences, is not easy. This is a direction that many VR film directors have been exploring. In a VR film work, if there is too much interaction, it will become too similar to highly interactive VR games. After the initial novelty, besides consuming certain physical energy, can audiences still comprehend the director' s expressive intentions for the story, experience audiovisual aesthetics, and the integrity of the plot? Compared with traditional film viewing dimensions, audiences' full senses are mobilized more thoroughly, and authorial detailed expressions can easily be overlooked due to excessive audience interaction dispersion, possibly requiring second or third viewing experiences to meet expectations between directorial expression and audience anticipation. If there is too little interaction, should traditional film expression methods be considered instead of abandoning storyliness for the sake of interaction, leaving audience experiences only at the level of

technology novelty? Therefore, based on the attributes and morphology of VR films, creation should fully consider audience participation, as well as the grasp of interactive methods and degrees, allowing them to maintain both storyliness and experiential quality.

Today, the industry still finds it difficult to define the expressive language of cinema under VR technology, yet this does not affect a large number of directors exploring the possibilities of digital film and television expression through virtual reality technology. Fortunately, many renowned film festivals have provided VR film creators with a space for expression and continuously broadened audiences' understanding of cinema. The unprecedented interactive sensory experience formed by the combination of virtual reality technology and cinematic art brings great attraction to audiences and will also bring a transformation to the film and television industry, establishing its own fixed audience group. It is believed that VR cinema will find its own expressive language in the future.

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Note: Figure translations are in progress. See original paper for figures.