Research on Literary and Art Development
2025, VOL. 6, NO. 3, 114-118
DOI: 10.47297/wsprolaadWSP2634-786524.20250603

A Study on the Interaction Between Technological Innovation and Cultural Expression in the Development of Film and Television Art History

Zhihan Su

Jimei University, Jimei, Xiamen, Fujian, 361021, China

ABSTRACT
This paper aims to explore the close relationship between technological innovation and cultural expression in the development of film and television art history. Through the analysis of different development stages of film and television art, combined with relevant research such as film technology history and cultural communication theory, this paper systematically explains how technological progress promotes changes in the form, content and communication methods of film and television art, and how film and television art becomes an important carrier reflecting social culture. The article analyzes the challenges and opportunities faced by film and television art in the context of globalization, emphasizes the importance of maintaining cultural diversity and innovative spirit for the sustainable development of film and television art, and provides a theoretical reference for understanding the laws of film and television art development.

KEYWORDS
Film and television art history; Technological innovation; Cultural expression; Globalization; Cultural diversity.

1 Introduction

As one of the most influential art forms since the 20th century, the development of film and television art is closely related to the changes in human society, the progress of science and technology, and the exchange and integration of culture. From the public screening of films by the Lumière brothers in 1895 to today's virtual reality (VR) and artificial intelligence (AI) film and television creation, every technological innovation has reshaped the form and boundaries of film and television art. At the same time, film and television art has always carried social and cultural connotations with a unique audio-visual language, becoming an important medium for reflecting the spirit of the times and spreading values. As film scholar David Bordwell pointed out in "A History of World Cinema", the development of film and television art is the result of the joint action of technological evolution and cultural construction [1]. In-depth research on the interactive relationship between technology and culture in the history of film and television art will help reveal the development laws of film and television art and provide theoretical reference for contemporary film and television creation and cultural communication.

2 The birth and initial development of early movies

2.1 Laying the foundation for technology

At the end of the 19th century, a number of technological breakthroughs brought about by the Industrial Revolution laid the foundation for the birth of movies. In 1824, Peter Roget proposed the theory of "persistence of vision"①, which explained the formation principle of dynamic images from a physiological perspective and became the core theoretical basis of film technology[2]. Under the guidance of this theory, Thomas Edison invented the "Kinetoscope" in 1891, which used continuous film and intermittent transmission devices to achieve continuous playback of images, but the device only supported single-person viewing[3]. In 1895, the Lumière brothers (Auguste and Louis Lumière) improved the technology and invented the "Cinématographe", which integrated the functions of shooting, projection, and printing, and realized the public projection of images for the first time. His masterpiece, The Arrival of a Train, recorded the scene of a train entering the platform with a 17-meter film. The realistic dynamic images shocked the audience and marked the official opening of the film era [4].

The technical characteristics of early films are reflected in the combination of mechanical transmission and optical imaging. Film is used as an image carrier, and the intermittent movement of the gear device is used to achieve frame-by-frame shooting and playback; the lens design draws on photography technology and mostly adopts fixed camera positions and panoramic perspectives. This technical limitation made early films mostly presented in the form of short films, with the content focusing on real-life scenes, magic shows, and comedy skits. For example, The Factory Gate by the Lumière brothers recorded the scene of workers leaving get off work, and Méliès' A Trip to the Moon used techniques such as stopping and reshooting to create fantasy effects, showing the exploration of technical possibilities by early filmmakers.

2.2 A preliminary study of cultural expression

Although early films were mainly about technology display, they already contained rich cultural expressions. From a social perspective, films became visual archives that recorded the process of industrialization. The Lumière brothers' factory-themed films presented scenes of machine production and reflected the labor status and social structure changes of the emerging working class. The "attraction film" theory proposed by American scholar Tom Gunning believes that early films attracted audiences through spectacular displays, which was essentially a cultural response to modernity[5].

In terms of cultural communication, early films assumed the functions of cultural enlightenment and entertainment. As an emerging mass medium, film broke the elitist barriers of traditional art and passed on artistic experience to ordinary people. For example, the French company Pathé spread French culture to all parts of the world through mass production and global distribution of films, promoting cross-regional cultural exchanges. The comedy elements and magic shows in early films satisfied the public's demand for novel entertainment and reflected the curiosity and exploratory psychology of the society at that time towards industrialized life. In terms of image content and expression, early films also reflected a response to local culture and the spirit of the times. When countries introduce film technology, they often combine their own languages, customs and narrative traditions to create localized works, making films gradually become a new carrier of national cultural expression. For example, the early Chinese film Dingjun Mountain uses Peking Opera performances as its core content, records traditional art forms in a vivid way, and also shows the early attempts of Chinese films to modernize and translate traditional culture. Therefore, although early films were not yet mature in narrative structure, they have initially demonstrated the great potential of film as a comprehensive cultural medium in terms of visual language, cultural communication and social reflection.

3 The peak of art in the silent film era

3.1 Artistic innovation driven by technology

In the 1900s and 1920s, film technology achieved breakthroughs in photography, editing, special effects and other fields, promoting the professional development of film and television art. In terms of photography technology, the diversification of lens focal lengths (such as telephoto and wide-angle lenses) and the advancement of exposure control technology enabled directors to achieve richer picture compositions. In 1915, D. W. Griffith used close-up shots for the first time in The Birth of a Nation to express character emotions, and enhanced narrative tension through rapid switching of scenes, creating a new paradigm of film language[6].

The maturity of editing technology is an important symbol of the silent film era. Griffith used parallel montage in Intolerance to cross-cut the stories of the four time periods of the Fall of Babylon, the Passion of Christ, the French Revolution, and modern labor-capital conflicts, constructing a grand narrative structure and demonstrating the artistic potential of montage in the manipulation of time and space. Soviet director Sergei Eisenstein further developed the montage theory. In Battleship Potemkin, he used the rapid editing of the "Odessa Steps" segment to enhance the visual impact and emotional expression, making montage the core means of film narrative [7]. The development of effects technology also brought breakthroughs to silent film creation. Méliès created science fiction scenes in A Trip to the Moon through model shooting and double exposure. In The Great Dictator, Chaplin danced with the globe using stop-motion animation technology to achieve a fantastic effect, demonstrating the filmmakers' unremitting pursuit of technological innovation. Soviet director Sergei Eisenstein further systematized the montage theory, emphasizing that the conflict and combination of shots can produce new meanings. In Battleship Potemkin, he used the "Odessa Steps" segment to create a strong visual impact and emotional resonance through rapid editing and composition design with a distinct rhythm, allowing the audience to experience the cruelty and intensity of class struggle in shock. Eisenstein's theory and practice enriched the aesthetic value of editing and established the status of montage as the core means of film narrative, which had a profound impact on the development of world cinema.

3.2 Deepening of cultural connotation

Films in the silent film era showed diversified characteristics in cultural expression. Social criticism themes became an important creative direction, and Chaplin's "Tramp" series of works had profound social significance. In "Modern Times", Chaplin showed the alienated state of workers in industrial society through exaggerated body performances - the protagonist was alienated into a mechanical part on the assembly line, repeatedly doing the action of screwing screws, and finally had a mental breakdown. The tragic core under this comedy appearance reveals the oppression of human nature by capitalist industrialization and triggers the audience's reflection on social issues.

The expression of national culture was also particularly prominent in the silent film era. German expressionist films became a symbol of national culture with their unique visual style. Fritz Lang's Metropolis, through geometric

architectural shapes and scene designs with strong light and shadow contrasts, metaphorically depicts the class conflicts and spiritual dilemmas in post-war German society; French avant-garde films emphasize experimentation with film language. For example, Luis Buñuel's Un Chien Andalou uses surrealist techniques to break the traditional narrative logic and explore the subconscious and irrational realms, reflecting French intellectuals' pursuit of artistic freedom.

4 The rise of sound films and color films

4.1 The impact of technological change

In 1927, Warner Bros. released the first sound film, The Jazz Singer, marking the beginning of the sound era. The breakthrough in sound film technology stems from the maturity of optical recording technology. By converting sound into light signals and recording them on the edge of the film, the synchronous playback of sound and image is achieved. The addition of sound has greatly expanded the expressiveness of the film: the actors' lines enhance the three-dimensional sense of character creation, and music and sound effects enrich the creation of emotional atmosphere. For example, in Alfred Hitchcock's Psycho, the violin sound effect in the bathroom murder scene has a high-frequency and harsh tone, which intensifies the audience's tension and becomes a classic example of film sound design[8]. The development of color film technology has gone through a long process. Early color films used hand-dying or mechanical printing technology, such as the "Pathé Color Method" of the French Pathé Company, but the color reproduction was low and the cost was high. In 1935, the American Kodak Company launched the "Technicolor process", which achieved the restoration of natural colors by recording the three primary colors of red, green and blue respectively through three strips of film. "Gone with the Wind" was the first large-scale film to use this technology. It reproduced the grand scenes of the American Civil War with gorgeous colors, especially the dress made of red curtains, which became a classic symbol of color in film history[9].

The introduction of sound and color is not only a technical innovation, but also a profound change in the composition and narrative style of film language. Sound films make dialogue an important means to promote the plot and portray the character's personality, promoting the complexity of the script structure and the delicate presentation of the character's psychology. At the same time, the organic integration of music and environmental sound effects enhances the audio-visual synesthesia and forms a more immersive viewing experience. Directors can create rhythm, lay emotions, and even build suspense and reversal through the coordinated scheduling of the relationship between sound and picture, making the film move from visual dominance to a comprehensive art of audio-visual integration. Color films have greatly expanded the expression space of images, transforming color from a simple reproduction method to a narrative element with symbolic and emotional orientation. Color matching began to serve the advancement of the plot and the expression of the theme, becoming an important tool for directors to control the atmosphere. For example, in The Wizard of Oz, the dream world uses highly saturated colors, while real life still retains black and white images, thereby strengthening the contrast between fairy tales and reality. As technology becomes more mature, color aesthetics gradually takes shape, and movies enter a new stage of using color as a language. Technological progress has enriched the artistic expression of movies and continuously promoted the renewal and improvement of the audience's aesthetic experience.

4.2 Expansion of cultural expression

The popularity of sound films and color films has made the cultural expression of film and television art more delicate and diverse. At the narrative level, the addition of sound makes character dialogue an important means of shaping character and promoting plot. The director can show the inner world and psychological changes of the characters through sound details such as intonation, pauses, and speaking speed. Woody Allen's works are particularly good at dense dialogue and philosophical thinking. For example, the frequent inner monologues and witty dialogues of the protagonist in "Annie Hall" show the emotional dilemma of urban intellectuals, and also present a complex spiritual outlook and the temperament of the times.

In terms of cultural communication, color films provide a new possibility for the visualization of national culture. With bright colors, gorgeous costumes and singing and dancing scenes, Indian Bollywood films vividly show the integration of Indian traditional culture and modern urban life; Japanese director Akira Kurosawa in "Kagemusha" uses careful composition and color contrast, such as red armor against green mountains and forests, to enhance visual tension and convey the Japanese Bushido spirit and oriental aesthetics. Color films also play an important role in global communication. For example, "The Sound of Music" used the magnificent color images of the Alps to bring Austria's natural scenery and musical culture to the world's attention, promoting cross-border exchanges and aesthetic sharing of regional cultures.

5 The global development of film and television art in the contemporary era

5.1 Communication changes brought about by technological innovation

Since the end of the 20th century, the rise of digital technology has completely changed the production and dissemination mode of film and television art. Digital shooting technology has gradually replaced film shooting with its convenience and low cost. Digital cameras such as RED and Arri Alexa have achieved 4K and 8K ultra-high-definition image quality, and there is no need to wash film, which reduces production costs and time costs. In the field of post-production, the maturity of computer graphics③ (CG) and digital synthesis technology has brought film and television special effects to an unprecedented level. James Cameron's "Avatar" uses motion capture and CGI technology to create the fantasy creatures and landscapes of Pandora, redefining the standards of film special effects[10].

The development of the Internet and new media platforms has reconstructed the film and television dissemination ecology. Streaming platforms such as Netflix and YouTube have broken the distribution monopoly of traditional theaters and realized the global instant dissemination of film and television works. According to Statista data, the global streaming market size will reach US$124 billion in 2023, and users can watch content anytime and anywhere through terminals such as mobile phones and smart TVs[11]. The rise of short video platforms (such as Douyin and TikTok) has spawned new film and television forms such as "vertical screen movies" and "micro short dramas", and promoted the development of film and television creation towards fragmentation and interactivity.

Digital technology has greatly changed the production and dissemination mechanism of film and television, and has also profoundly affected the way of cultural expression and the mode of audience participation. Traditional movies are centered on directors and emphasize linear narratives and complete structures, while digital film and television works emphasize openness and interactivity, and the audience has changed from "recipients" to "participants". For example, the interactive movie "Black Mirror: Bandersnatch" allows the audience to choose the direction of the plot at key nodes, breaking the single narrative path and expanding the expression dimension of film and television language. At the same time, the application of artificial intelligence and algorithm recommendation technology enables the audience to obtain a more personalized viewing experience, further blurring the boundary between "work-audience". The popularization of digital technology also provides an expression platform for more marginal cultures and ordinary individuals. Independent image creators can use low-cost equipment and social media to publish their works, breaking the entry barriers of the traditional film and television industry and promoting the diversification and democratization of film and television content. This change has made film and television art no longer just a tool for mainstream narratives, but also an important channel for expressing diverse cultures, individual experiences and social issues, demonstrating the openness and inclusiveness of film and television communication in the digital age.

5.2 Challenges and opportunities facing cultural expression

In the context of globalization, the cultural expression of film and television art faces a dual situation. On the one hand, Hollywood dominates the global film and television market with its technological and capital advantages. Among the top 10 global box office films in 2022, 8 are Hollywood productions, and the personal heroism and consumerist values they export have an impact on local culture [12]. French director Luc Besson once criticized: "Hollywood movies are homogenizing world films and weakening national cultural characteristics."

On the other hand, globalization also provides opportunities for cultural exchange and innovation. The rise of Asian films is a typical example: Korean films are known for their genre innovation and exploration of social issues. "Parasite" reveals social class contradictions through black humor and became the first non-English film to win the Oscar for Best Picture; Chinese director Jia Zhangke's works use documentary style to show the fate of individuals in the period of social transformation. "Mountains May Depart" explores the impact of globalization on traditional culture through a narrative spanning three decades. At the same time, cross-cultural cooperation has become a trend. For example, "The Great Wall" combines Chinese and American cultural elements. Although it has caused controversy, it has demonstrated a creative attempt at cultural integration.

6 Conclusion

The development of the history of film and television art is a history of technological innovation and cultural expression intertwined and mutually reinforcing. From mechanical film to digital intelligence, technological progress has continuously expanded the creative boundaries of film and television art; from social documentary to cultural reflection, film and television art has always been a mirror of the spirit of the times. Under the wave of globalization and digitalization, film and television art faces both the challenge of cultural homogeneity and the opportunity of diversified innovation. In the future, film and television creators need to seek a balance between technological innovation and

cultural adherence, use emerging technologies (such as AI-generated content, metaverse film and television④) to explore new possibilities of artistic expression, and at the same time take root in local culture, explore the core of national spirit, and promote the sustainable development of film and television art on the basis of maintaining cultural diversity, and contribute to the communication and inheritance of human civilization.

Notes :

(1) Persistence of Vision: When the human eye observes a scene, it takes a short time for the light signal to be transmitted to the brain nerves. After the light effect ends, the visual image does not disappear immediately. This residual vision is called "afterimage". This phenomenon of vision is called "persistence of vision", which is the basic theory of the formation of dynamic images in movies.

(2) Montage: The original meaning of French is "composition, assembly". In movies, it refers to the creation of unique time and space relationships and narrative logic through lens editing and splicing to achieve artistic expression, including narrative montage, performance montage and other types.

(3) Computer Graphics (CG): A discipline that studies the use of computers to generate, process and display graphics. It is used to create virtual scenes, characters and special effects in film and television production, such as the image of the Na'vi and the landscape of Pandora in "Avatar".

(4) Metaverse Film and Television: Based on the concept of metaverse, combined with virtual reality, augmented reality and other technologies, it realizes a new form of film and television that allows the audience to immerse themselves in the plot and interact with the virtual environment. It is currently in the exploratory development stage.

About the Author

Zhihan Su, A 22nd grade undergraduate student, musicology at the school of music.

References

[1] Bordwell, D., & Thompson, K. Film History: An Introduction (2nd ed.). McGraw-Hill. [M].2004.

[2] Roget, P. M. Explanation of an Optical Deception in the Appearance of the Spokes of a Wheel when seen through Vertical Apertures. Philosophical Transactions of the Royal Society of London,1824,114, 318-330. [J].

[3] Edison, T. A. Kinetoscope. U.S. Patent No. 1897,589,168. [P].

[4] Lumière, A., & Lumière, L.Cinématographe. French Patent 1895.No. 245,032. [P].

[5] Gunning, T.The Cinema of Attractions: Early Film, Its Spectator and the Avant-Garde. Wide Angle, 1986,8(3/4), 63-70. [J].

[6] Griffith, D. W. (1915). The Birth of a Nation. [F].

[7] Eisenstein, S. M. (1942). Film Sense. Harcourt, Brace. [M].

[8] Spoto, D. (1983). The Dark Side of Genius: The Life of Alfred Hitchcock. Ballantine Books. [M].

[9] Bowser, E. (1990). The Transformation of Cinema, 1907-1915. Scribner. [M].

[10] Cameron, J. (2009). Avatar. [F].

[11] Statista. (2023). Global Streaming Market Size. Retrieved from https://www.statista.com. [DB/OL].

[12] Box Office Mojo. (2022). Annual Box Office Results. Retrieved from https://www.boxofficemojo.com. [DB/OL].