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# Transformation of Film Directing and Cinematography through Technological Advancements: Focusing on Ang Lee's Films

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## *Abstract*

*This paper discusses the technical exploration of Ang Lee's cinematic works and the unique visual beauty he presents. Ang Lee has successfully tackled various themes and genres, creating films that harmoniously blend Eastern and Western cultural sensibilities. These films are technologically innovative and show the interaction between technology and art, industry and culture. Therefore, this paper analyses the correlation between film technology and visual beauty in Ang Lee's works, and explores the discourse on how the relationship between film technology and art has changed with the development of film. Furthermore, this paper aims to provide insights into how technological innovation can enhance artistic creativity. The contribution of this study lies in the in-depth exploration of the relationship between film technology and art, with a focus on technological innovation and the visual beauty in Ang Lee's works. The research findings reveal that Ang Lee's films showcase the application of advanced technologies, captivating audiences with their unique visual aesthetics. The utilization of emerging technologies enables his films to possess not only visual impact but also convey profound emotions and themes. We conclude that technological innovation in film not only provides artists with more creative tools and expressive techniques but also, when combined with artistic sensibilities, creates captivating and visually expressive cinematic works. This discovery offers a new perspective for film production and opens up greater possibilities for collaboration between artists and technology experts.*

*Keywords: Ang Lee, Film Technology, Film Art, Cinematography, Technical Innovation.*

## 1. INTRODUCTION

### 1.1 Necessity and Purpose

The modern film industry has undergone rapid changes due to the rapid development of film technology, which has had a significant impact on the visual aesthetics and narrative structure of films over time. The technology used in film production has continuously evolved from the past to the present, and has played a crucial role in the study of film theory and aesthetics. Although various previous studies have examined the technological aspects and changes in the film industry, there has been a lack of in-depth analysis regarding the

impact of applied film technology on the visual aesthetics and narrative structure of films created by individual directors. The development of film technology has influenced films in different ways, depending on the genre of the film and the directing style of the director. As a result, changes in film technology have directly influenced not only the film production process, but also the creative methods of directors and the way that audiences enjoy films [1]. Therefore, this study aims to explore the paradigm shift in Ang Lee's directing aesthetic based on the development and changes in film technology, and to examine his unique visual aesthetics and creativity.

Ang Lee is a director renowned for his original directorial aesthetic in the Taiwan film industry. His works have gained worldwide recognition for their unique visual aesthetics and narrative structure. Ang Lee's works have incorporated both traditional and digital film technology to create a distinctive visual aesthetic. This study will examine the characteristics of film technology used in Ang Lee's works, including directing, shooting, and changes in visual aesthetics. Examining the influence of film technology on the visual aesthetics and narrative structure of films through Ang Lee's works will help understand the specific effects of changes in film technology on film production and aesthetics. This study will also play a crucial role in understanding the overall changes and trends in the film industry related to film production. Furthermore, by examining how Ang Lee overcame the limits of aesthetic expression in existing films, this study will contribute to understanding the changes in his film philosophy and visual aesthetics.

## 1.2 Scope and Methodology

The scope and method of this research are as follows. First, from the perspective of the research objective, this paper examines the aesthetic characteristics and values of Ang Lee's digital films by examining his works from the perspective of the development of film technology. By doing so, it will be possible to systematically explain Ang Lee's exploration of digital technology and clearly distinguish the directing methods that have emerged after the digital transformation. In addition, it will be helpful in expanding the scope of research on Ang Lee's film aesthetics. Second, from the perspective of research content, this study combines the theoretical foundation of the philosophy of technology and aesthetics with the visual aesthetics of film media, based on a detailed summary and interpretation of Ang Lee's film aesthetics. By discussing the identity of films in the "post-film era", it obtains the necessary data to discuss the influence of the development of film technology on the essence of films and to propose the direction of film research [2]. Finally, from the perspective of research results, this paper analyzes the changes in Ang Lee's visual aesthetics according to the changes in film technology, and systematically categorizes the differences between his films and digital aesthetics. Through this, it will be possible to summarize the impact of the development of film technology on the film industry. This research uses a text-based research method and analyzes Ang Lee's visual language based on specific film content to understand the changes in film technology and visual aesthetics, and to analyze the changes in visual effects and aesthetic effects.

# 2. THE CINEMATIC TECHNIQUE AND ANG LEE'S FILMS

## 2.1 Technological Characteristics of Films

The production technology of cinema has made great progress, from traditional mechanical and film-based technology to digital technology, which has brought about many changes in the aesthetics of film. As a medium that combines culture, art, and science, movies were shot on film before the 1990s. However, with the development of digital technology, digital cameras replaced film cameras, as well as all related shooting equipment and post-production techniques underwent digital innovation. As a result, unprecedented new visual

scenes could be created. Comparing the aesthetics of film from the era of traditional mechanical technology with that of film based on digital technology, there are significant differences in the nature of cinema, the subject matter and imagination of cinema, and the expansion of the spatiotemporal dimension of cinema. James Cameron(1954~), a famous American film director, said that today's visual entertainment production technology is undergoing significant changes, and that these changes have brought about many changes in the way movies and other visual media are produced, which he called the "digital art Renaissance". It is not an exaggeration to interpret this to mean that the driving force behind the development of movies today is the increasing influence of film technology [3].

When digital video technology first appeared, people focused mainly on creating unrealistic scenes and emphasizing the visual effects of video. At that time, the aesthetic significance of digital video was not a major consideration. However, as digital film production technology and post-production and compositing technology advanced, they not only changed the way films were made, but also began to shape the psychological reception of audiences and form a more diverse range of cinematic aesthetics. Film technology and art can be seen as a complementary and evolving relationship. For example, early films were simply a record of simple scenes, but with the development of montage editing techniques, the montage video aesthetic emerged, and with the development of lens technology, video could evolve into a visual art form capable of expressing different angles and depths. Film sensitivity technology made it possible to produce videos with fast movements, and camera movement technology made it possible to create more dynamic visual aesthetics. More recently, the emergence of immersive movies using computer graphics has created new visual effects and aesthetics that were previously unseen [4].

To study film technology, one must pay attention to the technological attributes of film and its historical evolution, and based on this, must aesthetically organize the relationship between film technology and art. Film is considered as one of the most active cultural industries of our time, a visual record reflecting contemporary narratives and psychological worlds, and a great asset of humanity. Film is an art that conveys stories through visual language, and the audience enjoys all visual stimuli that appear on a large screen through sight and hearing. Due to this characteristic of film, filmmakers have concentrated on visual expression, leading to the development of various visual media such as color film, digital film, 3D stereoscopic film, virtual reality (VR), augmented reality (AR), and more, which have formed a large industry structure [5]. These important changes in the film industry are all connected to the development of film technology and have become the driving force to increase the competitiveness of the film industry.

## 2.2 The History of Film Technology within Ang Lee

Ang Lee, is one of the few filmmakers who has experienced the glory of traditional film from the era of film to the era of digital film, and has actively participated in the exploration of digital film. His films have continuously evolved with the advancement of visual technology, showing a diverse range of visual spectrums over time. His early films were mostly made using traditional film techniques. Works such as "Pushing Hands", "The Wedding Banquet", "Eat Drink Man Woman" and "Sense and Sensibility" dealt mainly with family issues and exploration. Ang Lee's recognition of the value of these early films made him one of the most acclaimed directors in Hollywood. In 2000, his work "Crouching Tiger, Hidden Dragon" showcased his unique technical visual aesthetic. The film is known for its wire action and various fight scenes, as well as its overall vivid color composition. This was made possible by the development of wire action technology and film post-production techniques. As a result, the film won the Best Foreign Language Film Award, the Cinematography Award, the Art Direction Award and the Music Award at the 73rd Academy Awards, becoming the first Chinese-language

film to do so[6].

As we enter the 21st century, the film industry has begun to incorporate digital technology into its productions. Ang Lee also took on the challenge of using digital film techniques for his movies. A case in point is the 2003 film "Hulk". Ang Lee utilized computer graphics to recreate the surreal Hulk character, and the vivid expressions portrayed by the Hulk were expressed as a new visual beauty. In 2007, Ang Lee delved into the world of digital intermediate (DI) technology for the first time while shooting Lust, Caution. Two years later, the avant-garde film Avatar was released, ushering in the era of 3D movies. The film, directed by James Cameron, inspired Ang Lee greatly, leading him to unveil his first 3D film, Life of Pi, three years later. This film also employed advanced computer-generated (CG) techniques, which Ang Lee had acquired from his previous experience on Green Lantern. At the 85th Academy Awards, Life of Pi won four awards, including Best Director, Best Cinematography, Best Visual Effects, and Best Original Score [7].

In 2016, Ang Lee made a giant leap in the field of film technology with "Billy Lynn's Long Halftime Walk", which was shot at the unprecedented speed of 120 frames per second. This technical innovation and fusion of film language greatly enhanced the realism, visual impact, and emotional expressiveness of the screen. 120fps+4K+3D offered viewers a visual feast, creating an instant and immersive cinematic world. In fact, movies have been shot at 24 frames per second since the 1930s, based on the principle of human visual persistence. Gemini Man used "digital actor" CG technology to allow the simultaneous appearance of a 50-year-old Henry Brogan (played by Will Smith) and his younger clone (played by a younger version of Will Smith). This allowed for the replication of a younger version of Will Smith through digital technology.

## 3. CINEMATOGRAPHY AND TRANSFORMATION OF VISUAL AESTHETICS

### 3.1 Changes in Cinematography Techniques: Scene Composition

Director Ang Lee's early films used traditional filming and production methods to explore themes of family culture and ethical concepts through the language of images. In his early family trilogy, including "Kung Fu Instructor," "Marriage Celebration," and "Eat Drink Man Woman," As shown in Figure 1(a), Ang Lee preferred to use static images with no camera movement, focusing on capturing the dialogue and actions between characters to develop the overall story. Scene selection was mainly medium or close-up shots, with directing emphasis on the dialogue scenes between the characters who were the narrative subject of the story. During this time, all films were shot on film, which created a unique artistic visual aesthetic with color and lighting that is unmatched in digital cinema. As a result, Ang Lee became a celebrated film director in Taiwan. However, due to the limitations of the Taiwanese film market, there were restrictions on his creative filmmaking.

"Sense and Sensibility" marked the directorial debut of Ang Lee in Hollywood. At that time, American movies led the global film market based on huge capital. However, Ang Lee did not agree with the blockbuster-oriented Hollywood filmmaking method, and instead brought the artistic framework of European cinema to create "Sense and Sensibility" [8]. This was a realistic compromise as a filmmaker considering the reality of the Hollywood film industry and the demand of the movie market. In this film, Ang Lee demonstrated a distinct visual aesthetic and established his own aesthetic ideology. The film poetically expressed time, space, and the movement and stillness of characters through smooth scene transitions and varied screen compositions rather than long, fixed frames. To achieve this, he used techniques uncommon in traditional films, such as long takes, wide shots, and blank scenes without characters. As shown in Figure 1(b), These technical elements allowed a poetic representation of time and space, which was the strength of the film, and allowed a story with a richer narrative structure to unfold.

Ang Lee's movie "Crouching Tiger, Hidden Dragon" presented a unique visual beauty of battle scenes by

reinterpreting the wire action technique. In the past, the limitations of screen composition were significant because actors performed in a weightless state during wire action scenes. Therefore, the predominant method was to use close-ups of the upper body to minimize the illusion [9]. However, director Ang Lee introduced creative ways to overcome these limitations. As shown in Figure 1(c), He developed a special camera frame that moved with the actors, allowing aerial combat scenes to be filmed. As a result, long-distance scenes of the bamboo forest battle could be beautifully depicted with a composition similar to Eastern paintings. With this example, director Ang Lee is actively responding to the development of film technology and exploring new possibilities in film production. The bamboo forest battle scene in "Crouching Tiger, Hidden Dragon" can be regarded as a work in which his creativity and technical ingenuity are combined, and it has opened up new horizons for wire action technique.

| (a) Static Shot | (b) Wide Shot | (c) New Wire action Technique |

**Figure 1. Changes in Cinematography Techniques**

### 3.2 Changes in Spatial Technology: 2D and 3D

In 2009, the release of the movie "Avatar" seemed to herald a transition from 2D to 3D in the movie industry, leading to a surge of interest in 3D technology. 3D movies are a medium that transcends the limitations of the screen and provides audiences with a three-dimensional sensation, and this has given rise to a new visual style based on "visual stimulation" using 3D technology. As a result, 3D stereoscopic film technology and powerful CG technology have become central to film production, exerting a significant influence on the creation of visual beauty [10]. Director Ang Lee did not miss this trend, and his first 3D movie, "Life of Pi", released in 2013, received an enthusiastic response from both film critics and the general public. Through this film, we can catch a glimpse of Ang Lee's interest and philosophy regarding 3D movies, as well as his unique directing style. Ang Lee's attitude towards film technology is one of "balance". He has not overused 3D technology to create stereoscopic movies. This philosophy seems to be his own groundbreaking solution to avoid the mistakes that can occur when relying too heavily on film technology.

"Life of Pi" is a movie that tells the story of a 17-year-old boy who spends 277 days in the Pacific Ocean with a Bengal tiger. Ang Lee used CG technology to tell this story perfectly, which had been difficult to do with real images. In addition, he used stereoscopic technology to create scenes that were as close to reality as possible for the audience, perfectly capturing his artistic sensibility on the screen. Ang Lee's unique directing style can be seen in many scenes throughout the movie, including fantastic and shocking ones. In particular, the various scenes, such as the sea, the island, the church, the hometown, the stars and the sky, present an amazing level of realism in visual beauty. Due to the difficulties of shooting on the actual ocean, the film crew shot in the controlled environment of an artificial pool. They used a device that creates artificial waves to create different wave patterns and stage vivid scenes of the ocean. In addition, through the application of CG technology and 3D imaging, the underwater ecosystem was depicted in a mystical manner, while scenes of the starry night sky, moon, clouds, and more were portrayed with a strikingly lifelike quality. Furthermore, scenes of a forested island imbued with otherworldly beauty and a sense of enigmatic terror were shown, leaving a

striking visual impact through a powerful combination of advanced CG technology and the creative prowess of Ang Lee. The poignant image of a tiger's back and a melancholy smile reflected on Pi's face in the final scene was an extremely profound moment, highlighting the exceptional filmmaking and artistic ingenuity brought about by the fusion of filmmaking and artistic creation.

### 3.3 Digital Video Technology: Post-production editing, Image compositing, CGI

Director Ang Lee incorporated his unique style into his film "Hulk" while adhering to the typical Hollywood movie style. Using various visualization techniques, including post-production editing and computer-generated imagery (CGI), he created a distinctive visual beauty. The movie "Hulk" was Ang Lee's first attempt to adapt a comic book into a movie, a genre that inevitably requires computer graphics technology. In particular, CGI was a key element in solving the narrative challenges while serving as a striking technical feature of the film [11].

From the beginning of the film, Ang Lee constructed creative visuals using a single scene from the virtual space of comics. He also used subtitles following the style of the original comic to lead the audience's immersion in the characters and story. Ang Lee utilized screen split techniques to simultaneously express multiple scenes and structured the screen in a grid format similar to that of comics. As shown in Figure 2(a), in a scene where the protagonist Bruce meets other characters, he effectively showed the situation occurring simultaneously by dividing the screen into three parts. Through this method, the emotions and psychological situations of each character were delicately depicted. Additionally, this film used fast-paced video editing techniques to increase the film's pace and tension. Various camera angles were used to quickly show the same scene from different perspectives, integrating them into a single screen and delicately depicting each character's emotions and situation. These digital video editing techniques enabled Ang Lee to create more realistic visual effects and action.

The technique of digital image synthesis offers a more visually rich and innovative on-screen display because it is not limited by the limitations of regular camera lenses and can provide a wider field of view. In the movie "Life of Pi", the scene of the convergence of sky and sea was repeatedly depicted using advanced post-production image synthesis technology. Figure 2(b) shows the reflection of the sky's scenery on the ocean was achieved through symmetric reflection, with the protagonist situated on the vast expanse of the sea. Such scenes undoubtedly bring about a sense of realism and visual appeal. The modeling of three-dimensional space is also able to enhance the depth perception of the movie scenes and create an illusion of reality that offers a more authentic movie-going experience [12]. Meanwhile, Ang Lee successfully implemented CGI technology as an important technical element in movie "Hulk" to enhance immersion by smoothly realizing the interaction between the virtual character, Hulk, and the surrounding environment. In particular, Ang Lee used motion capture technology to create more natural movements for the Hulk. One of the most significant features of this film is that the creation of the character, which has a human-like shape, through the new visual technology that applies human body movement information to the character, shaping the narrative structure of the film. This film is Ang Lee's first attempt in Hollywood's action and science fiction film genre, and although it did not achieve great commercial success, it is an important work that demonstrates his understanding of the Hollywood film model and his determination to explore film technology [13].

### 3.4 The Evolution of Screen Ratios: From 4:3 to Widescreen Ratios

The freedom of the aspect ratio is a characteristic that distinguishes film from other 2D arts such as painting. Widescreen gives the audience the feeling of seeing reality with their own eyes. Widescreen technology emerged in the 20th century and quickly became an important technological element in creating a sense of

realism for filmmakers and audiences alike. The aspect ratio also played an important role in the aesthetics of film. With widescreen technology receiving much attention in the technical category at the Academy Awards, major production companies abandoned the 4:3 aspect ratio they had been using. Widescreen technology is a good example of how technological advances interact with and influence the style and evolution of cinema. As this new technology was actively used in film production, filmmakers had to continually adjust and adapt to meet the demands of visual expression at the time. The problems that arise during the process of technological change serve as examples of potential aesthetic problems, or show that many aesthetic problems arise from technical problems.

There are two main ways to change the aspect ratio of movie screens. First, by covering the image area while recording or displaying and creating black borders above and below the video to adjust the ratio. Second, by transforming the video to make the screen wider. This is done by compressing the video captured with a transformation lens during recording, and then decompressing it with a corresponding lens during display. Due to various problems such as distortion of close-up shots, singularity of focus distance, and limitation of shooting backgrounds, directors who opt for a larger aspect ratio must go through corresponding adjustment processes. For example, they can compensate for the singularity of lens use by reducing the zoom lens and relying on the actors' movements. They can avoid focus problems that can occur with zooming by using a fixed lens for close-up shots. By arranging the screen layout and actor positioning on a wide screen, they can avoid distortion caused by camera movement and emphasize depth within the screen by showing diagonal movements of the characters[14].

IMAX and similar giant screens capture scenes from different movies and project them simultaneously onto a circular screen using multiple projectors. Such movies on these giant screens give viewers a greater sense of realism by greatly expanding their field of vision. The external and formal changes of these films have become even more diverse with the advent of the digital film era. For example, Ang Lee's early films mostly used a 1.85:1 format, but after he ventured into Hollywood, he used a wider 2.35:1 aspect ratio in films such as "Ride with The Devil" and "Crouching Tiger, Hidden Dragon." In particular, it is said that he chose a wider aspect ratio in "Ride with The Devil" to show vast landscapes and precise screen compositions. By choosing different aspect ratios according to the genre, content, and director's preferences, movies maximize their unique aesthetic effects. Therefore, the aspect ratio of a movie is closely related to its development history and is constantly changing in pursuit of its aesthetic value, following the advancement of film technology and the demands of the times. The evolution of aspect ratios provides audiences with new viewing experiences and serves as a driving force for the development of the film industry [15].

| (a) Screen split Technique | (b) Post-production Image Synthesis | (c) 4K Resolution |
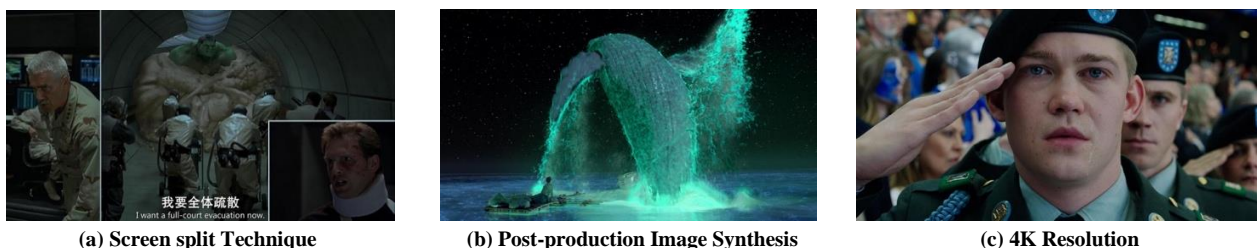
*Figure 2. Changes in Digital and Post-Production Technology*

### 3.5 The Changes in Resolution and Frame Rate: 4K & 120fps.

The films "Gemini Man" and "Billy Lynn's Long Halftime Walk" utilized the 120fps format. Especially, it was produced as a 4K resolution film. These technical formats helped to achieve a sharp and smooth visual

image that far exceeded the common frame rates used at that time. 120fps is capable of playing back 120 frames per second, making it sharper and helping to eliminate motion blur compared to the typical 24fps movie screen. During the filming of "Life of Pi," Ang Lee was inspired by various technical aspects of James Cameron's movie "Avatar," which introduced the 48fps frame rate technology. The success of "Avatar" became a catalyst for many filmmakers to increase their frame rates, and the application of high-resolution and high frame rate technology spread to many films, including Ang Lee's movies [16].

On the other hand, high-resolution and high frame-rate technology can aid in enhancing the visual quality of a film, but it also poses a significant burden in terms of equipment and infrastructure during the production process. For instance, higher frame rates require more powerful equipment and storage, and theaters must upgrade their projection equipment to accommodate the technology. Furthermore, more time and money must be invested in processing high-resolution images, and actors must bear the burden of delivering more detailed and nuanced performances due to high resolution and high frame rates, it is shown in Figure 2(c).For these reasons, some film researchers argue that high resolution and high frame rates can actually detract from the quality of a film and project unrealistic scenes that can negatively affect the viewing experience. However, despite these issues, 4K resolution and high frame rate technology have provided many moviegoers with stunning visual stimulation, and have had a positive impact on the growth of the film industry[17]. Therefore, changes in resolution and frame rate in the film industry have significant effects on the demand for film production and consumption. The development of such technology is constantly evolving throughout the film industry, and filmmakers strive to enhance the artistic and commercial aspects of their films through the adoption of new technology.

Advances in film technology have revolutionized the visual experience of cinema and contributed greatly to the resurgence of the film industry. Director Ang Lee has demonstrated his unique visual expression that combines Eastern and Western cultures, keeping pace with new technological advances, ranging from traditional film production techniques to the latest CGI in his films, from early cinema to recent works. In his early films, he developed the story using fixed frames and various perspectives, and created an artistic visual experience through the unique light and color of film. After entering Hollywood, he successfully implemented poetic spatiotemporal expression by introducing various screen compositions and techniques. His philosophy on film-making is to pursue his unique directing style by balancing technology dependence rather than relying on reckless technological dependence. Furthermore, he dramatically improved the visual effects and storytelling of the movie "Hulk" by utilizing excellent digital post-production techniques. The movie preserved the style of the original cartoon and used CGI technology to create a realistic Hulk. This allowed Director Ang Lee to lead differentiated changes in the film-making process and became an opportunity to highlight his own creative directing style. Finally, in the movies "Gemini Man" and "Billy Lynn's Long Halftime Walk," Director Ang Lee applied high resolution and a high frame rate of 120fps to provide astonishing visual effects in the movie. The introduction of such technology has increased audience immersion and enhanced the artistic and commercial value of Director Ang Lee's films.

## 4. CONCLUSION

The advancement of film technology has revolutionized the visual experience of cinema and has greatly contributed to the resurgence of the film industry. Director Ang Lee has exhibited his unique visual expression that combines Eastern and Western cultures, keeping pace with new technological advancements, ranging from traditional film production techniques to the latest CGI techniques in his films, from early cinema to recent works. In his early films, he developed the story using fixed frames and various perspectives, and created an artistic visual experience through the unique light and color of film. After entering Hollywood, he successfully

implemented poetic spatiotemporal expression by introducing various screen compositions and techniques. We found that, Ang Lee has explored various film genres for almost 30 years, from his early works to his present pieces, leading the way in new technologies and aesthetic changes. His films create a unique visual world by harmoniously combining characteristics of both Eastern and Western cultures, and have elevated the value of the contemporary film industry. With an active attitude towards introducing new film techniques, he portrays his unique stories and characters, offering audiences fresh cinematic experiences. Ang Lee's accomplishments have driven the evolution of the ever-changing film industry, as he consistently challenges himself with new endeavors. His example can inspire future generations of filmmakers to understand and integrate the cultures of the East and West in their creations.

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