A Functional Study of Film Sound Design in Science Fiction Films

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Abstract: As a form of art combining audio and visual, movie sound effect is an important element in building the story world of the movie. When sound films first appeared, they were recognized and welcomed by the public, and it is extremely important to use sound effects in narrative films so that the audience can have a better connection with the fictional world. As one of the popular cinema genres, science fiction movies were loved by the audience when they first appeared, attracting the audience's attention with brilliant special effects, but the role played by sound effects in them should not be neglected. The purpose of this paper is to analyze the role of sound effects in science fiction films, and will use *Avatar*, *Inception*, *The Prestige* and *Gravity*, the four films, respectively, to explain the three functions that sound effects have. They are to enhance the realism of the movie, to help complete the temporal construction of the movie and to express the inner world of the characters.

1 Introduction

The screening of *The Jazz Singer* in 1927 marked the beginning of the era of the sound film, the film was converted from a visual art to a combined audio-visual art form, and the expressive and infectious power of the film was greatly enhanced. Almost as soon as it appeared, the sound film aroused the public's love and anticipation, and its participation made the film industry penetrate further into the public's life and be more widely accepted by people[1] (Chion, M., & Gorbman, C. 2009). The importance of film sound has been argued many times by professionals in the profession, while Batten, J. P., & Smith, T. J. (2018) showed an experiment in their book, this experiment focuses on observing the role of sound in guiding the audience to pay attention to the movie, and they came to the conclusion that the impact of sound on the audience in most of the movies is still less than that of the visual elements.[2] As a result, sound designers should wake up to the fact that it is precisely because there is still a lot of room for improvement in sound design and production that the audience's emotions are focused on the visual elements when watching a movie, and the sound does not play the role it should. This further requires sound designers to further study the individual and comprehensive effects of each major auditory component on the audience's behavior, so as to stimulate the audience's emotions and shape the overall experience of the film with the most appropriate and powerful sound. Therefore, it is necessary to explore the role of sound effects in cinema, which will help creators understand the importance of sound and design sound effects in a way that is more relevant to the movie.

Langkjær, B. (2009) states that sound has a significant role to play in cinema, whether it is a realistic genre or not, it is able to give the audience a sense of reality through sound.[3] This essay will explore the function of film sound in science fiction films and will be divided into three main points in total. Firstly, the essay will briefly introduce some relevant information about science fiction films, and then it will specifically analyze the function of sound effects in science fiction films. In arguing that sound effects can enhance the authenticity of science fiction movies, this paper will use *Avatar* as an example. In analyzing the role of sound effects in constructing and connecting time and space in movies, this paper will use Nolan's *Inception* and *The Prestige* as examples. The third aspect of the argument is that sound effects have the function of shaping the inner world of characters, and *Gravity* will be used as an example to analyze this.

2 About Science Fiction Films

With the development of science and technology, the movie industry is undergoing changes, and movie production techniques are constantly being updated. Films have gradually been able to produce virtual scenes as a way to construct an unreal space that is not part of reality. Science fiction film is a kind of genre film, which adopts science fiction elements as its theme, and is a film and television work that uses a fantasy scenario based on science as its background and develops a narrative on this basis. The elements used in science fiction films are usually alien life, superpowers, or time travel, to name a few. Science fiction films often use possible future worlds as the background for their stories, using elements such as spaceships, robots, or other transcendent technologies to emphasize the difference between reality and reality. It is due to the existence of these non-realistic images and

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pictures that new demands are placed on the production of sound.

In a film, the image as an object of visual perception of the audience, its spatial construction affects the overall style of the movie. And as another important element of the movie, sound as an auditory object is also the same. Therefore, the production of sound is no longer *just* a simple restoration of the real world, but needs to be matched with the image to create a non-realistic sound effect, and allow the audience to recognize that the sound and the image are matched.

3 The Function of Sound Effects in Science Fiction Movies

3.1 Enhancing cinematic authenticity

Sound effects have the function of enhancing the realism of the movie. Since the story background of science fiction movie is fictional and not similar to the real world, the content of the picture must be beyond the real world, and things that do not exist in the real world will appear. In order to bring the audience into the movie story, sound effects need to make up for the lack of realism in the picture. Sound effects can be broadly categorized into ambient and kinetic sounds, with ambient sounds creating a sense of spatial realism and kinetic sounds portraying the overall worldview in detail.

First of all, in terms of ambient sound, take *Avatar* as an example, this movie takes place on Pandora, a planet in outer space, where the Na'vi, who look completely different from humans, live, as well as Avatar, a technological product of the combination of humans and the Na'vi. The director has constructed the natural environment of Pandora with extremely beautiful images of dense jungles, waterfalls on cliffs and exotic animals. When dealing with the ambient sounds of the forest, which is similar to the natural landscape of the planet - the rainforest - the director has tried to restore the realistic sounds as much as possible, with the real sound of leaves, wind and insects as the main sound effects. This is to create a realistic general setting for the story so that the audience can combine reality with fantasy. As Chattopadhyay, B. (2017) cites David Sonnenschein's theory that "ambient sound can create a space in which the viewer is surrounded".[4]

However, because the Na'vi in this movie have the ability to communicate with their ancestors or their gods, and they have a unique way of communicating with nature and animals, and the Sacred Tree is the source for them to listen to the voice of their ancestors, so there are some glowing plants in the rainforest with fantasy colors. The director used a special effect sound for the sound of these plants. When the protagonist connects and communicates with the Sacred Tree, there will be a transient high-frequency sound similar to a light effect. The purpose of these types of sound effects is not to restore reality, but to fit the viewer's imagination of what light sounds like.

Foley, such as the sounds of weapons, guns, or animals that are the subject of the picture, are another important component of movie sound. In *Avatar*, there are many monsters in the area where the Na'vi live. For example, the hero has just entered the jungle and is being chased by a huge Triceratops-like monster that doesn't exist in the real world. However, its screams use sound effects that are similar to the sounds of real beasts, this is to increase the authenticity of the movie and to be able to make the audience psychologically identify with it. This is due to the fact that movie is an art with interactivity, therefore the movie sound must satisfy the audience's aesthetic needs and perceptions,[5] and it needs to conform to the audience's psychological expectations in the treatment of the monster's sound effects.

3.2 Constructing and Connecting Cinematic Space-time

Sound effects have the function of helping the movie to complete the construction of time and space, and connecting time and space. Nolan's films have always been known for their complex timelines, and his stories are characterized by rapid changes in time and space, which require a strong connection between the past and the present. As an audio-visual art form, sound plays an important role in his movies, enabling the audience to better understand the changes in time and space, and to read the plot of the story.

Inception's main character is an extractor, and the entire story revolves around him leading his team through several layers of dream space. It's a movie made up of multiple time-spaces, and through the editing technique of cross-montage, a complete plot is built with frequent switches between different time-spaces. Specifically, these spaces are the separated reality and several layers of dream space, while the constant alternation of the past, the present, and even the transitions of different time and space between different dream spaces are mixed together. Due to the complexity of the relationship between space and time, it is easy for the audience to have difficulty in recognizing the relationship between space and time, which results in a disjointed plot. Therefore, the film uses sound effects to expand and link the spaces of the movie, and clearly explains the relationship between each space and the other spaces. *The Prestige* is another sci-fi film by the same director, and the time change in this movie is reflected in the jumping of the timeline, with a great span of time.

3.2.1 Constructing Time and Space in Cinema

For the construction of space-time, in the opening sequence of *Inception*, the protagonist Cobb infiltrates Mr. Saito's dreamscape in order to steal information from him, but fails because he recognizes him. Since the actual owner of the dreamscape is Mr. Saito, his suspicion causes the dreamspace to begin to destabilize. The group of main characters raise their watches when they realize that Mr. Saito has figured out what they're up to and the roof begins to shake. The movie gives a close-up of the dial, showing the second hand moving very slowly at the beginning, then gradually speeding up until the final moment when there is a "whoosh" (to give the impression that time is speeding

up), which is connected to the explosion that follows, and doesn't end until the change in time and space is complete. This not only tells the audience that time is about to change from the second layer of dream space to the first layer of dream space, but also achieves the effect of increasing the tension of the audience at the same time. The movie is set up so that each layer of dream time will be twenty times faster than the previous one, but since it's impossible to really speed up that much on screen, the sound of this special effect is very crucial. It's also a scene transition, but unlike normal transitions, the real effect of this sound effect is that it creates a sense of spatial transition while the audience understands about the flow of time. The second scene where the hands appear is from the first level of the dream back to the second level of the dream, the second hand of the clock continues to slow down, giving a shot of the character falling asleep, with another explosion, the transition to the second level of the dream.

Thom, R. (1999) in his article suggests that great sound is not just about loud voices, but about forming a whole with the cinema and being fit to the narrative.[6] It is not only the image that shapes the sound, but also the sound that is able to shape the image. In the episode of dream-within-a-dream, in addition to the above clip, at the beginning of the 11th minute of the movie, Cobb, who is reluctant to wake up in order to complete his mission, is pushed into the water, using the water as a medium to connect the two layers of the dream. Starting off in the water with little to no normal sound of falling into the water, the scene next shifts to the second layer of the dream, where the hall erupts as if a flood is breaking out, and the sound of the water begins to get stronger, signaling Cobb's impending awakening. Until he jolts awake from the bathtub, there is a momentary pause in the sound of the water, approaching a state of silence, in order to mimic the diminishing character of the sounds around a person when they are submerged in water and the momentary disorientation of waking up from a dream. Cobb then jumps up from the bathtub, and the sound of the water returns to its normal, natural state, successfully completing the time shift. The sound of water appears in both scenes as a connecting object that gives relevance to the different locations.

These two spectacular sound effect settings make it possible for the audience to perceive the changes in time and space more clearly, because the opening sequence is devoid of character dialogues or other information to account for the relationship between the dreams. Relying on the images alone, it is impossible to make the narrative coherent and complete, and it is easy for the audience to be thrown into a confusing situation. However, the continuity of the sound effects allows time and space to continue and complete the transition, which is indispensable to this movie.

3.2.2 Connecting Time and Space in Cinema

The construction of time and space is more oriented to the setting of the overall story of the movie, such as how the different levels of dreams mentioned above work and how they relate to each other in time. The temporal connection, on the other hand, implies how the director utilizes sound effects to make two completely separate scenes be linked together that are spanning a greater or wider degree.

The Prestige, one of Nolan's earlier works, also shows a complex shift in the relationship between space and time. Due to the intertwined and complex timeline and the different spaces caused by the two parallel lines of two different magicians narrating separately, the picture can't complete the storytelling alone, and then it needs to be assisted by the sound.

From 7:39 to 8:15, the past is introduced by Borden flipping through the diary in the "present", and then Angel in the "past" writes and studies Borden's diary to begin the narration of his own experience. The sound of the train is then added to the background after Borden looks through the diary, and then the sound of the train grows suddenly louder at the beginning of Angel's story, creating the feeling that it is passing in front of the audience. Both use the elements of "flipping through the diary" and "the train" to shift time and space, with the rustle of writing and turning pages diminishing as the scene shifts, while the sound of the train increases from barely audible, signifying the shift in the timeline.

To sum up, the use of unnatural sound plays a great role in the complete construction of movie narratives.[7] It not only serves as a medium to guide the audience subconsciously in the complex time-space transition, but also stimulates the corresponding emotions in the necessary moments, allowing the audience to be brought into the situation.

3.3 Reflecting the inner world of the character

As human's imagination of the future world, science fiction movies often portray the inner world or spiritual space of human beings. However, mental space does not exist in real life, so movies usually use special effects or sound changes to guide the audience, so as to emphasize that the movie characters are in their own inner world. Film sound not only restores and exceeds the authenticity of the space scene, but also constructs the audience's psychological identity and satisfies the curiosity and desire to explore the space films.

Gravity is a sci-fi disaster movie that focuses on astronauts Ryan and Matt and others who have an accident while out repairing a space telescope and are impacted by a massive amount of debris, with only two surviving. The two prepare to head to the International Space Station in space, but on the way back accidents occur, and Matt unties the rope attached to Ryan in order to keep her alive. When Ryan thinks she can't hold on, she sees a vision of Matt and is saved and returned to Earth as a result. There are two ways to show the inner workings of the characters in this movie, the first is to use only sound elements and the second is a combination of sound and picture.

In the first case, take for example in this sequence where Ryan and Matt are struggling to get back to the spaceship in the universe, you can hear the director adding a special sound effect - a gasping sound. First of all, space is a vacuum where the human ear can't hear sound, and this

gasping sound is unphysical. Secondly, in this clip, the camera is running a lot, and the distance of the camera from the main character is not enough to hear such a clear breathing sound. But this sound added here is not only not abrupt, but highlights the anxiety and fear of the protagonist, and also mobilizes the audience's emotions, making them empathize with the protagonist who is struggling on the edge of the death line.

The highlight sequence of the movie occurs when Ryan meets Matt's figure as he prepares to give up her life; this sequence is a combination of sound and picture, with Matt's figure appearing from outside the capsule, and his voice is very realistic, while there is indeed a momentary silence when the hatch is opened, which continues until Matt closes the hatch- This is to show that the environment of space itself is silent. The sound design is such that the audience, and even the characters, believe that Matt has returned, but soon the "real" alarm ticks, pulling the audience out of Ryan's mental world. The clip is dominated by the images, but the sound production enhances the credibility of the images in a way, while at the same time allowing the viewer to follow the heroine in the "real" part of the movie and find out what is going on.

4 Conclusion

The importance of film sound has been argued many times by professionals in the profession, while Batten, J. P., & Smith, T. J. (2018) showed an experiment in their book, this experiment focuses on observing the role of sound in guiding the audience to pay attention to the movie, and they came to the conclusion that the impact of sound on the audience in most of the movies is still less than that of the visual elements.[2] As a result, sound designers should wake up to the fact that it is precisely because there is still a lot of room for improvement in sound design and production that the audience's emotions are focused on the visual elements when watching a movie, and the sound does not play the role it should. This further requires sound designers to further study the individual and comprehensive effects of each major auditory component on the audience's behavior, so as to stimulate the audience's emotions and shape the overall experience of the film with the most appropriate and powerful sound.

In conclusion, this essay lists three roles of sound effects in sci-fi films, but this only covers most of the functions and does not fully demonstrate the importance of sound effects. As an audio-visual art form, sound and picture are in a reciprocal relationship, so the harmony of the sound as a whole (vocals, music and sound effects) is very important, and in the process of constructing them in harmony with each other, it not only promotes the narrative of the movie better, but also enables the movie to have diversified methods of expression. The exploration of sound design is an endless process, which needs to be considered and innovated with the times. As in the early days of sound films, sound creation was only limited to synchronization of sound and picture, but now there is room for the creation of sound outside the picture, and there is also the production of emotional sound effects. Movie sound creation is only one part of the whole movie production, but the lack of it or the imbalance of sound and picture will not be a great and outstanding movie.

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