

# Introducing Cognitive Psychology in Film Studies: Redefining Affordance

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**Abstract:** This paper investigates how interdisciplinary research impacts the film industry in research and practice by introducing psychological concepts. Psychology, especially neural and cognitive science, provides a distinct advantage when examining humans' audio-visual processing mechanisms and esthetics questions regarding the film. By introducing psychology, film researchers and filmmakers could rethink and evaluate the current research paradigm from a broader point of view. This paper consists of three parts: (1) a discussion on the nature of film using an interdisciplinary approach; (2) a discussion on the characteristics and attributes of film; (3) an introduction of the psychological concept of "affordance" to film studies and practice. Although the film interdisciplinary research paradigm is still under development, we argue that introducing the other subjects is innovating the field of film research, providing us with a new angle to examine the intersections of ubiquitous but complex human esthetics activities.

**Keywords:** Film studies, Film perception and cognition, Affordance, Audience research.

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## 1. Introduction

The film has been seen as the witness of history, culture, and technology, and has reflected people's lives and social development since its invention. Scholars used to explore film from philosophical and theological perspectives. However, the film is a complex medium that has both corporeal and non-corporeal properties. People are watching the three-dimensional world from a two-dimensional screen; because of filmic techniques, they sometimes believe what they see and hear is real. Apart from its abstraction argument, the film also evolves in light of expression techniques, narrative construction, and the increasing accessibility of the medium (Cutting et al., 2011; Luan, 2016; Luan, 2018; Luan, 2019; Luan et al., 2021; Luan, 2021). Recently, researchers from psychology and other disciplines have tended to use film as a stimulus to understand the human mind. Scholars conduct research using film as an expression of humanity, testing the audience's memory, and monitoring and analyzing the audience's emotion as the research focus. However, some film scholars are still insisting that semiology should be the research focus, which engages with an advanced level of the human mind. Because all the aspects of the film (making process, filmic techniques, watching method) are changing, it is not hard to realize that the filmic performance mechanism cannot be easily obtained by copying the research from semiology (Mitry, 1987). These studies raise some questions: Do we really understand the nature of the film? If we are aware of film's exact nature, what should be the appropriate research position and method to conduct film perception and cognition research? In order to answer these questions, we must examine whether the audiences capture the message that filmmakers want them to see and hear, how to test the audience's interpretation, and how to identify a primary unit of meaning in a film in order to explain the discrepancy of interpretation between filmmaker and audience.

In the development of film history, the advent of new theories and new technologies has changed films internally and externally. These changes not only bring more possibilities to the expression of films but also transform the way in which people watch the world. Furthermore, the film has now been widely accepted as an audience-driven art. More and more people are paying attention to audience research. Over the past few decades, the remarkable ticket sales of commercial blockbusters have not only reoriented public interest but also brought huge profits for the world economy, from which we can see that the combination of films and contemporary productivity is an inevitable trend of historical development. If combined with any art form and technology, films can not only show visible but also imaginary entities that are beyond human perception, and which embody the infinite potential of the human mind. With the increasing demands of the audience on the form and content of films, filmmakers and scholars from various fields have joined the ranks of film study. Therefore, the focus has shifted from the symbolic nature of human beings to the visible information exchange process between films and human beings. That is, it has moved from the "what is ..." question of psychoanalysis (a classical film theory), to the "how to..." question of cognitive psychology. The former focuses on the spiritual dimensions, while the latter focuses on the process. From this, we can see that the division between the content and the process exists in film study.

To establish a complete frame and appropriate position for research, this paper will systematically search theories related to film studies to spark new perspectives and methods for study. The literature review of this paper will be divided into three parts: (1) a discussion on the nature of film from an interdisciplinary approach; (2) a discussion on the characteristics and attributes of the film; (3) an introduction of the psychological concept of "affordance" to film studies and practice. This paper tries to answer the following questions: "What is the universal principle of film?" "What is

a filmic expression?” “What is the aesthetic and philosophic significance of film?” This approach is in contrast with film cognition theories, which deal with the questions “how is film information perceived and interpreted by the audience?” and “how does film information impact the audience’s memory, emotion, and inference?”

## **2. The Nature of Film from an Interdisciplinary Approach**

### **2.1. Film is a Psychological Product**

What is the ontology of film? Ontology refers to the theory of studying the nature of the origin of the world in philosophy. Regarding the ontology of film, Bazin (1967) proposed the film ontology theory—that film demonstrates the integrity of the world, the authenticity of time and space, as well as the identity between the image and the subject in the objective world. He also pointed out that the appearance of the film is a psychological product due to human being’s natural need to reconstruct the world since ancient times, namely “competing against the time”. He explained that the development of photography skills, such as the full-length shot and deep focal length shot, satisfy the psychological needs of the audience through the complete representation of reality. Since film is a psychological product of human beings, the research on film cannot be divided into the single scope of linguistics or any single discipline. Given this context, which subjects can be involved in film research?

Film is a psychological product that can have “tendency” and other characteristics, it also has functions that language cannot realize. Langer (1953) pointed out that human beings can think, memorize, describe things, and reproduce relationships as well as interaction rules between things via language. Through the exchange of language, human beings can communicate with each other, thus presenting ideas and connections between various concepts. However, language is not all-purpose; some content and statements cannot be directly expressed by languages, such as complex ambivalence and emotions, thoughts and impressions, and memory and reconstructive memory. None of these can be fully and clearly expressed through language. Langer thought this weakness of language was due to the inner logic originating from language itself; namely, the language used must be consistent with the object that is described. The purpose of language is to accurately express the description as well as the relationship with the object. Therefore, the reproduction of emotion may be excluded from this process because human emotion is full of complex contradictions. Langer also pointed out that art made up for language’s deficiency in the aspect of emotional expression because art was metaphorical. Langer’s stance indirectly proved the importance of the function of metaphor in film and provided another explanation of film as a psychological product. At the beginning of the last century, semiotics had a significant impact on film research. However, as the trendsetter of semiotics, Metz (1974) denied that film had a relatively large similarity with language. He said that a shot was not equivalent to a word. It had no double articulation in phonology and semantics, which were typical characteristics of these morphemes (Bordwell, 2009). Therefore, as the seventh art form, the film possesses a complex means of expression, which cannot simply be analyzed using linguistics. Secondly, due to modern technological development, the film cannot adopt the analysis method as

other art forms have, such as literary works and drawing (Benjamin, 1936). Benjamin pointed out that the application and influence of mechanical reproduction in the film were different from other literary works such as painting. For other art forms apart from the film, mechanical reproduction is the external condition of its mass circulation, which has no impact on the internal structure and component of the artwork. However, the mechanical reproduction of film directly originates from its production technology. Such expensive production technology forces the mass circulation of film and makes it an art form to be shared by the collective. Benjamin explained that people saw a special art form in film because, for the first time, its artistic characteristics were completely determined by its reproducibility. At the same time, the film was also correctable. The mechanical reproduction makes film abandon its eternal value (aura) as an art form.

The art of film has a variety of expression methods. Because film acts on the audience’s auditory and visual sense directly through the sound and image of the two-dimensional screen (or 3D illusion), the film has strong intuition and authenticity. Instead of the indirect imagination similar to literary works, it directly presents sensory input to the audience. The shot also cannot be analyzed in accordance with linguistics. Moreover, the impact of film on the audience via direct sound and image stimulation also cannot be analyzed through a single simple subject. However, based on the discussion about the essence of art and the interpretation of the definition of film ontology, interdisciplinary research focusing on psychology is needed in film analysis.

## **3. The Characteristics and Attributes of Film**

### **3.1. Film is More Complex than Language**

Through exploration of the previous research above, it is concluded that although the film has long been interpreted and analyzed with “film language,” there are essential differences between film and text language. What then, are the exact differences between them? In examining this problem, scholars have carried out research from various perspectives; some from the non-literary expression of film, some from the camera, and some from the film practice.

From the nonliterary perspective of the film, Balazs (1945) compared the film to a kind of language. He considered film as a sort of new situation and a new language, which had the characteristic of arbitrarily changing the distance between the audience and the expression of the object on the screen. The film can divide a complete scene into different shots and change the shooting angles, shot depth, and focus in the same scene. Also, with the use of the montage method, it can connect the shot together to form a time series of pictures. Although Balazs seems to have included film in linguistics research, he opposed looking upon the film with the similar and general law of art. In fact, film research is classified as the theoretical orientation of the film itself.

Mitry (1997) proposed that the image had the function of a symbol. By copying reality, images form pictures following certain rules of structure that can communicate information and express ideas as time goes on. Therefore, the film can be understood as a symbol with linguistic significance, which makes the film a kind of language. As far as Mitry was concerned, language is our tool to understand and grasp the world, as well as the direct performance and external form of thoughts. Thoughts are impossible to separate from the

language which is used to express thoughts. Those scholars who do not regard the film as a language have essentially narrowly defined language into the abstract symbol system. He further explained that language is a means to express thoughts and is related to the psychic structure organizing this expression; namely the working of the brain. Mitry's combination of expression, thought, and emotion also indirectly proves the characteristic of film as a psychological product. Mitry has added that the semiotic function of images is not fixed. Instead, images only have semiotic significance when they form a picture according to certain rules with the help of the relationships contained within the film. Furthermore, the "symbol" of a film image only has single or temporary significance. In other words, the film image is endowed with new significance through a variety of methods, which are not divorced from the practical significance of the original shot object. The expression and interpretation of the new significance not only draw support from the relationship between the plot before and after but also depends on the overall background and the environment presented in the film. For example, a hand holding a knife may have many meanings. In a horror film, without any knowledge of the plot before or after, if a girl is running through a dark corridor with a knife in her hand, the girl could be considered a killer or a victim. Moreover, the running action of the girl could be understood as chasing someone or as escaping. At the same time, the audience may exhibit different emotional responses. If the audience thinks the girl is a killer, they may be nervous and produce the speculation of a victim, as well as the anxiety of not knowing what will happen. If the audience thinks the girl is a victim, they will be worried about her. These are all the additional effects that cannot be brought by the text narration "a girl is running in the dark corridor with a knife in her hand." As a result, the expression of the film is more complicated than the language expression. As mentioned before, a film can make up for the complicated emotions that language cannot express because the significance implied in the film is far greater than the meaning of the direct expression of words.

As mentioned above, the film has a mirror image system with metaphorical meaning, which is composed of moving pictures. Its difference from the symbol language system composed of text language is not reflected on the subject or object, as considered by film scholars. The fundamental difference between the expression of film and text are modalities and ways of expression. First, language expresses or writes with words, while film expresses with material objects/people in real society, or the "object resembles"/people created by computer technology as the carrier. However, words in the language are usually different from each other due to different national and cultural backgrounds; in contrast, films have fewer differences. For example, fire has many ways of expression in different languages, but in film shooting, it is almost always the same. No matter which country you come from, and whether you can understand the film or not, as long as the image of fire appears on the screen, anyone can recognize this object. In this way, the film has more universality and general principles than language. Secondly, the things and people presented in the film have direct performance; on the other hand, language—as a non-expressive indirect meaning symbol—does not have direct performance. For example, when a film shows a ragged beggar, the audience can see the age, appearance, clothes, looks, and sex through the direct

presentation of the beggar by the shots. However, if there is a sentence describing the beggar, even if the sentence includes vivid words of description, the image presented by the words is less direct than the one brought by the picture. Thirdly, the space-time processing of film produces second-level significance to the audience. For example, when describing a person living alone in the forest, under a panoramic shot, the person is in a corner of the dense forest; while under a close shot, the half-body image of a person matches with the dense forest behind. These two are sure to produce different effects, especially on the psychological activity of the audience when understanding the film story. In the expression of literary words, such an example would only be narrated as "a person living alone in the forest," which would not have second-level significance. Therefore, because of the nonliterary characteristics of film, the angle of the camera, and the filmmaking process, the analysis of film cannot be purely established on the basis of literary analysis, nor can it be based only on linguistics. The visual-audio language used by film and the expression of shots are far more powerful than words. The film has achieved things words fail to express, especially the description of complex emotions and the attraction of the audience's attention. These are all unachievable by words. Ironically, it seems like the film has realized what the ruling class has always been longing for to a certain degree, in that it has a unified impact on people at a certain time and at a certain place and catches people's psychological activities.

The film is the most perfect mixture of science and art in the 20th century. The film is, at its core, a visual-audio medium. Therefore, the more developed its visual-audio expression is, the higher and more realistic and believable its image will be. Such an art form stimulating "reality" becomes the optimal method of expression so that the audience can move from the modern form of language with words as the form, and return to the original state, in which they express thoughts and emotions and record events through the creation of pictures. As a result, in contrast with words, film, to some extent, makes up for the gaps between culture and illiteracy from the perspective of intuitive understanding.

## **4. Psychology in Film Studies and Practice**

### **4.1. The Brief Historical and Theoretical Background of Film Psychology**

In this paper, film psychology refers to film perception and cognition studies. Cognition is the combination of affection and perception. People understand the form and meaning of artistic works through the cognition of sound, shape, and color (Luan, 2016; Luan, 2018; Luan, 2021). Cognition is the foundation of aesthetic and rational activities in the brain. Viewers' interest in a film originates in cognition, through emotional and imaginative responses, and results in "untruthful thoughts"—a newly created reality—which is the ultimate goal of filmmakers. Through the special audio-visual way of expression, filmmakers tell stories within a certain time frame by organizing and building shots with cameras and projecting them on the screen. Filmmakers use true stories or make up stories and apply a virtual effect to present what is not really happening at that time. In other words, filmmakers make up virtual scenarios to make the stories seem to be true. The creative processes and products of filmmakers and the interpretative processes of viewers had long been neglected until the appearance of cognitive science in the twenty century.

Cognitive science arose in the mid-1950s and matured in the 1970s, gradually influencing many disciplines. For instance, cognitive science has made great changes in aesthetic research. Similar to aesthetic science, cognitive science has significant interdisciplinary characteristics, but it emphasizes empirical studies of the human mind and spirit. In short, cognitive science is a new approach to learning about an old issue—the relationship between the human mind and the human spirit.

Bazin (1960) pointed out that film is the psychological production of humans' pursuit of a vivid recovery of reality. He added that film appears because humans are born with a basic psychological need, namely "competing against time" (Bazin and Gray, 1960). Bordwell also recognized the obvious psychological and social effects of film (Bordwell, Staiger, and Thompson, 1985; Bordwell, 1997; Bordwell and Carroll, 2012). As a psychologist, Münsterberg (1916) opened a new research area in which the audience's psychological process is used to investigate film. Regardless of what a film portrays, Münsterberg always emphasized the decisive role of the subject (human), as well as the importance of humans' psychological feelings in aesthetic and cognitive activities. Moreover, Münsterberg was the first person to link physical characteristics (Persistence of vision, which refers to "the miracle by which the still-silver halide dust of photography is transformed into palpable, living motion" (Anderson and Anderson, 1993).) with holistic psychological (Gestalt) interpretation, and to bring forward the idea that film is completed in the imagination of the audience instead of in the projection on the screen. Pudovkin also advocated the application of montage in films (Taylor, 2007), objecting to the view of montage as a method of cutting. However, Pudovkin paid attention to the links between shots which represent the fluency of montage. The consistent montage would link a series of shots into a line to promote the development of plots. Secondly, while Eisenstein regarded montage as a minor to produce metaphor and deep thought, Pudovkin believed that montage is a dialectical thinking process that reveals the internal connection with real life. Montages could clearly demonstrate the meaning of a film and promote the plot of a story. Epstein (1963) expanded on this notion with the concept of Delluc's "photogenic," and proposed that films are the production of psychology. He believed that the images viewers see on the screen are the selection of the cameras and editing choices. While watching a film, the viewers extract and refine a certain essence from the characteristics of the film. The concepts that viewers get from the screen are derivations from the concept of camera selections. Arnheim (1957) was the first psychologist of the Gestalt school to systematically study the audio-visual expression approaches of film. He proposed the partial illusion theory regarding the relationship between images and reality. Arnheim assumed that we are satisfied with learning about the most essential aspects of real-life and selectively learn only what we consider important. Therefore, to represent only these most essential parts in films could satisfy the audience, who would then have a complete and artistic impression of the film.

At the source of the evolution of film as a psychological product is the fundamental human desire to replicate reality, according to Bazin, who challenged the psychological theories supported by Epstein and Pudovkin. Bazin (1967) came up with a core proposition about film, which he described as the unity of images and the filmed objective

reality. He saw films as duplicates of psychology in reality and as phenomena of idealism. Bazin insisted on the psychological foundation of all arts, including photography and film, indicating that humans pursue irrational desires that have extended from primitive society. Theories alone do not suffice in helping us distinguish those desires from reality and illusion. Bazin's notion that objects in the film are consistent with their existence in reality was a novel idea in film psychology theory.

Mitry's conception of film reconciled montage and the long shot. In attempting to integrate the research of Eisenstein, Arnheim, Bazin, and Balaz, he established the three layers of theoretical cognition of film aesthetics—image, symbol, and art (Mitry, 1997). The first layer is the vision, which is a concrete object and a fraction of reality. The second layer is the signal, which means that visions are formed into images according to specific structures that produce the meaning of signals. The first and second layers make the film a language, and filmmakers bring this language to the level of art through imagination. In order to find scientific evidence for his film aesthetics, Mitry attempted to find an interpretation using psychology, specifically cognitive science. As the representative of semiotics, Metz further developed the linguistics approaches of Saussure and established the systematic study of film semiotics (Metz, 1982). He suggested that films imitate the human mind and the world and that films can produce pleasure and illusion in audiences. The intense emotions expressed in a film would resonate with the audience members as they combine their imagination with the film (Metz, 1982). Meanwhile, Metz emphasized that a film screen is just like a mirror that reflects everything but the viewers themselves. Thus, the viewers perceive the audio-visual information on the screen. Viewers play an active role when they emotionally connect with characters on the screen and ultimately recognize themselves in them. This emotional identification can be achieved only by an "agreement" between the audience and the camera. However, Metz's work was defined as psychoanalysis instead of cognitive psychology and did not include any interpretation of the viewers' psychological perception processes.

Deleuze (1986) found a practical application of film theory with the help of the theory of substance. Deleuze improved the ambiguous concept-image-movement of Bergson (1988) by giving the film "subjectivity." The image is a subject in itself, separate from human intuition. The subjectivity is decided by very special mobility (effect de mobility, translated by the writer). In fact, using film as a carrier, Deleuze included time, movement, and integral life in his theory. Deleuze provided a new thinking method for us to study film; it distinguished two film movements in detail: movement (le mouvement) vs (travel space) l'espace parcouru (translated by the writer, Colebrook, 2002). The former cannot be divided or reappear, while the latter can. Movement cannot make position changes in space and time as reconstruction and decomposition (reconstitution or decomposition) can. This difference reflects Deleuze's very complicated point of view: the substance can't be divided without changing it. Deleuze opposed Bergson's statement that film is a mirage (illusion cinématographique). According to Deleuze, a film is a perceived event that exceeds the image on the screen, creating another world, one between the real world and the imagination. The world that viewers see in the film is not a world of substance but a world that can be felt. Film simulates the intuition of viewers in daily life, linking

different image flows into a cohesive whole, which includes both order and conflict. While watching, viewers unconsciously integrate the image flow into the time flow of the real world. However, the viewing experience also provides more possibilities of perceiving “reality,” which cannot be replicated in real life. The film does not build an image in light of daily experience. It breaks the experience, freeing viewers from a fixed and single angle of view. For example, through discontinuous visual images, a film can create one whole meaning. Viewers rarely notice this discrepancy. In this sense, viewers are liberated from a single way of observing the world. According to Deleuze, film subjectivity is generativity, which makes viewers not just think about singular images but combine them into a whole.

Hochberg and his colleagues indicated that daily experience teaches people what kind of rules to use for judging two-dimensional images (Gombrich et al., 1973). The viewers can recognize “hidden clues” in personality priorhistory. Gestalt holds that people’s reaction to an image is not decided by the stimuli themselves but by the modular structure and coding method of our brain. Hochberg also pointed out that Gestalt theory ignores a very crucial matter. When viewers are watching a film, they acquire information through multiple scans and build relations among these pieces of information. This proves that the viewer’s interpretation is selective and subjective. The viewers do not perceive all information in two dimensions; they choose what they want to see. Hochberg applied the whole explanation to film analysis. After discussing the psychological process of viewers watching different shots of the same scene, he concluded that the viewers’ understanding of film is decided by eye movement.

Bordwell (1985) applied cognitive theory in filmology explicitly for the first time. He believed that the narrative principle is the basis of film analysis, and is essentially responsible for specific audience responses. For example, a classic Hollywood film has fixed plots and structures, including a goal that needs to be achieved. The constructive process of the film is similar to the cognitive process. Viewers are not passive receivers. They use all of their sensing abilities to find clues in film and interpret them. Finally, they can build a story with ordered reasoning (Bordwell, 1989). Although Bordwell was trying to put forward a new method for film research, he did not completely deny psychoanalysis. In his methodology, he avoided the linguistics analysis model and instead adopted perception theory and reasoning theories to figure out how viewers can understand the cause and effect narration as well as time and space relationships in the film.

Increasingly, film research is relying on scientific methods. It is abandoning the abstract and philosophical approaches and replacing them with quantifiable data. In the late 1980s, Carroll voiced strong criticism of psychoanalysis. He held that scholars must abandon the theories that impede the pursuit of research and urged for a new method of film research (Carroll, 1988). Later on, Carroll and Bordwell made another amazing contribution. They criticized the grand theory research (structuralism, semiotics, post-structuralist theory, psychoanalysis, Marxism) which had occupied film research for many years, and they discussed the situation that film research may face when the grand theory ends (Bordwell and Carroll, 2012). Although there are many problems in cognition research, Bordwell and Carroll have worked with many other scholars and have suggested other possibilities and theory directions of film theory forms. Since grand theory

had long dominated film research, some scholars believed that without it, film research would lose meaning. They worried that the nature of the film and viewers’ response would lose attention. Scholars have paid much attention to finding the corresponding relation between film work and grand theory, which has caused the separation of film research from the nature of the film, the audience, and the filmmaker. Furthermore, Carroll pointed out that it is impossible for scholars to compare the expression of a film with the expression of language. The essential issue is that an adult can understand the expression in the film without any training (Carroll, 2011). Carroll provided more possibilities for studying film expression in the area of human perception and cognition. Furthermore, Bordwell (1989) pointed out that most the researchers may consider film studies as a hermeneutic discipline whose primary mission is to interpret texts; however, he indicated that cognitive studies provide film studies with more clear and convincing research methods, which require scholars to conduct comprehensive research about condition, phenomenon, and the impact that film brings to its audience. As the earliest supporter of cognitive film studies, Anderson has conducted his research from “an ecological perspective,” claiming that “ultimately, the utility, the adaptive value of any sensory system, is its capacity to gain information about the environment, information that an organism can act upon to increase its chances of surviving” (Anderson, 1996, p. 24). As for the film, he pointed out that the illusion of film may have no connections with culture and advanced level brain activities (such as induction or deduction). Each individual has the ability to process information acquired from the environment around them through their internal visual and audio systems (Anderson, 1996). However, those visual and audio systems have not evolved for human beings to watch the film; instead, films have evolved to allow us to watch them (Cutting, 2005; from Anderson and Anderson’s book *Moving Image Theory: Ecological Considerations*), and human beings instinctively compensate for the incomplete psychical world in films (Anderson, 1996).

Like Bordwell, Currie (1997) provided a naturalistic explanation of the film phenomenon, namely, the way we understand the film is, in many aspects, the same way we understand the real world. This explanation of film requires us to further explore the audio-visual level, to use the continuous images presented by the film to illustrate coherent meaning, and to extract the story from the order of events. In most cases, human beings interpret film effortlessly, because we are not only born with the cognitive ability to describe the vision object, but we also have the ability to recognize intention. Furthermore, Currie argued that “film images have no grammatical structure, no ‘atoms’ or minimal semantic parts out of which they are composed” (Currie, 1997, p. 56); thus it is impossible to break up a film into sentences. Currie thought that film does not contain cognitive illusion because viewers believe what they are watching on the big screen. The switch from language study to “visually presented narratives” requires scholars to “devise ways of isolating narrative elements without recourse to language” (Currie, 1997, p. 56); however, how to achieve this goal is uncertain. Currie suggested that the psychology of film and most comprehensive psychological theories have the same origin and should be consistent with each other. Empirical psychology is the most efficient research method to interpret the effect of imagination on visual representation and other

parts of a film.

Scholars did not uphold Anderson's ecological approach to exploring cognitive film research; in contrast, some scholars began to explore the relationship between film interpretation and emotion. Departing from the notions of intention and imitation stressed by Currie, Tan (1996) considered the film an emotional machine, and he emphasized that filmmakers use the narrative that is filmic technique to make us produce an emotional response and to continue controlling the change of this reaction. To some extent, Tan (1996) also supported illusion theory, arguing that the viewers accept film as an authentic reality to some extent but will not be completely deceived. The audience has multiple coding abilities, and they know the world shown by the film is a "constructed reality." In other words, the film makes a kind of illusion rather than a delusion. The complex film expression system manipulates a particular vision of the characters, to create a witness emotion in the viewers, who focus on specific characters' structure with empathy and interest. Smith (1995) proposed that viewers give the film an emotion through "engagement" and sympathy which is a process comprising three parts: recognition, alignment, and allegiance. Recognition refers to the viewers' process of building characters; alignment refers to viewers' establishment of a consistent relationship with characters that relies on the shared vision and knowledge; and allegiance describes viewers' moral evaluation of characters, resulting in a cognitive and emotional relationship with them. Smith's theory provided an intuitive display of an emotional process produced by viewers when watching the film, allowing narrative and emotion to become important topics in cognitive theory.

It is worth noting that a common focus of film cognition research is based on the audience's reaction to a film, but for the research object, there are three aspects: 1) film experience—how the audience perceives and understands a film; 2) the interaction between film and social culture, which is integrated with humanistic research. 3) narrative and aesthetics—the analysis of how the physical attributes of film collaborate with the story to create the viewers' reaction.

After Cutting and his students analyzed the brightness and movement of different types of film and measured the shot length (the samples were 150 Hollywood films since 1930), Cutting found that the shorter the shot is, the faster the movement in the picture is. In addition, to explore function analysis of the action and depth perception as well as perceptual stimuli, Cutting used modern perception research tools to analyze a film's rhythm. He speculated that the golden ratio found in art, nature, and mathematics might play a role in explaining why people would focus on film. The mathematical theory may not be a fixed formula of aesthetic expression, but a  $1/f$  concept from chaos theory. The  $1/f$  proportion is a regular rhythm found in all of nature and is a constant in the universe (Cutting et al., 2010). Cutting examined the rhythm of the film by respectively comparing the shot duration length and the average shot length of an entire film. He found that modern films (post-1980) are closer to the universal ratio of  $1/f$ , so modern films can increase our attention. That is to say, when the director, photographer, and editor select a film's shot composition, they should achieve synchronization with the human's natural focus mode. Later, Luan and Cutting ran an experiment to explore the fundamental mechanism that impacts viewers' perception, interpretation, and preference. They recruited 70 senior college students as participants, including both film majors

(32 participants) and non-film majors (38 participants). The film *New York, I love You* (2008) was used as the experimental film stimulus. The film is composed of 12 short independent films. Each short film is a separate story. Every story is filmed by different directors with different actors. The study only used the first story, filmed by Wen Jiang, because the author interviewed the screenwriter and acquired an idea of how the story had been constructed and designed to unfold. Luan and Cutting found that the reason the two groups had a low preference score was due to the narrative design. The filmmaker failed to insert an important clue at the beginning of the story, which caused the attention lapse. From the literature reviewed above, it is clear that film psychology switches the research focus from film to a broader vision. Psychology—especially cognitive science—could provide more scientific evidence to answer questions that traditional film studies could not touch.

## 4.2. The Psychological Concept "Affordance"

Psychologists did not stop their exploration in film psychology when "New Looks" became the focus of mainstream research. Gibson (1979) criticized both "New Looks" and behaviorism while proposing the concept of "Affordance." He defined the affordances of an environment as "what it offers the animal, what it provides or furnishes, either for good and ill" (Gibson, 1979, p. 119). To be more specific, the affordance of anything is a specific combination of the properties of its substance and its surfaces taken with reference to an animal (p. 67).

According to this definition, affordance can be measured only when it is connected with animals. It is not the abstract physical property, but rather the specificity of animals and is relevant to animals' gestures. Unlike the subjectivity of value, affordance is subjective as well as objective. It does not change with human will. However, it is also subjective. Without an animal, "walk-on-able" will lose the logic of existence due to it having no target. Gibson believes affordance is a dichotomy that goes beyond subjective and objective and is physical and psychological or neither of the two. Affordance points to the environment and observer at the same time. The truth is that affordance has been used as a source of inspiration by many. This is likely due to the confusion surrounding the source of the concept.

In effect, Gibson's understanding of this concept evolved over time. Unfortunately, his own ideas on the concept were not finalized until after his death (Jones, 2003). The ambiguity of the concept has prevented scholars from looking at its nature of it. The most reasonable interpretation of Gibson's idea of affordance was described using the contemporary view: affordance needs an extra "mental calculation" to interpret perception. While he focused on visual perception, Gibson believed that this concept can apply to all types of perceptual modalities.

Later, scholars explored and extended this concept into a broader view. Turvey (1992) proposed a formalization between affordance (environment) and effectivities (agent). He indicated that affordances are dispositional properties of the environment and effectivities are dispositional properties of the animal, and these properties can be only actualized when they meet in a certain space and time (Turvey, 1992). Stoffregen, however, held a contrasting point of view on affordance. He proposed that affordances cannot be defined as properties of the environment alone, rather as properties of the animal-environment system; when an environment and an

agent meet in a certain time and space, they generate a new property (affordance). According to his idea, affordance is an emergent property that either belongs to the environment or to the animal. Chemero advocated for Stoffregen's formalization and introduced another concept into affordance, he proposed that affordances are a relation between the abilities of an organism and features of an environment. Generally speaking, affordances are relations between certain properties or modalities. Affordance contains both subjective and objective attributes and more. It is a physical and psychological product or neither. It points to the environment (space) and observer (agent) at the same time. These understandings raised some questions for researchers: How to introduce affordance into film studies and what impact this concept may bring?

In the film, when filmmakers are designing a story plot, they use each shot as the carrier to express audio-visual information. The plot designed by filmmakers needs to be clearly understood by the viewers. Viewers should be aware of the logical relation of former and latter, namely who did it, what happened, what made it change, and how it will change. Thus, no matter statement or as a flashback, design is narrative affordances: the narrative information should be readable and understandable. Therefore, we should call it sensible affordance. Even if viewers miss several shots, they can generally guess the development of the story.

The word affordance hides an important content-resonance. For example, a hard, wide, and smooth surface feels "walk-on-able" compared to a sloping surface. When viewers are watching a film, they do not need note taking or professional training to understand it. Just like the conditional reflex, they can spontaneously receive the information in the film and are free to imagine anything they want, and they may react exactly as the filmmaker intended. A film such as this would be considered to have strong affordance. Animal consciousness provides the basis (the sense of place, event, useful information, and dangerous recognition) of ecological psychology. It also explains how animals control and organize their actions, which results in their sense of satisfaction (Gibson, 1979). It is unfortunate that Gibson's theory is grounded more in philosophy rather than real scientific evidence. For example, the explanation of affordance lies in an abstract notion that is difficult to validate through experiments. However, Gibson's research is improved when examined from a cognitive approach and using neuroscientific findings. Thus, psychology and its experimental method will provide film scholars and filmmakers a new avenue to review and evaluate their work.

This paper proposes an alternative approach to traditional film studies by introducing the concept of affordance and exploring the significance of interdisciplinary research on understanding a film—both from the filmmakers and the viewers' perspectives—and then applies them in analyzing and evaluating their roles in the establishment of endogenous logical narrative structure in human brains. Since the mid-1980s, broad research interest has emerged to explain the power of moving images from different disciplines. Scholars are turning their focus from film theory, history, and aesthetics to psychological explanation. For instance: why do films engage viewers into the stories? How do filmmakers' manipulations of film techniques stimulate our senses, guide our mental activity, control our attention, and arouse our emotions? What is the psychological principle of narrative, and what is the condition of applying it? Throughout film

history, each technology, creative idea, and influence from other disciplines not only have let unprecedented changes take place in the film industry but have also contributed to the variation in the ways people view the world. Film techniques are able to create things that don't exist in real life, and the changing narratives and shot combinations enrich filmmakers' creation means and narrative manners. In addition, they also change the audience's reading of a film and watching abilities to a certain extent. It is apparent that film psychology (cognition research) as an interdisciplinary study lag behind the curve on issues, methods, and trends deemed important by its adjacent disciplines such as film, communication, and psychology. Four specific issues are pertinent for this discussion.

There are various existing resistances to the application of scientific approaches in the arts and humanities. There is no doubt that essential aspects of creativity in the arts cannot be quantified; they are emotional, complex, and vary between different individuals. In film studies, some scholars may not agree with using data to analyze film, especially empirically based cognitive science. Some scholars may debate that film is a single and specific art phenomenon, arguing that it does not have the necessary universal attributes. Hence, they refuse to conduct a film analysis from a scientific perspective. Such a closed research attitude keeps film studies away from innovation; most film studies are still following ancient theories and methods. Apart from their artistic appearance, the primary purpose of most films is to tell a story or several stories. Therefore, the narrative cannot be separated from the process of making scripts and its relevant theories—especially those theories related to psychology. As Herman (2009) concludes, the script is a representation in terms of which an expected sequence of events was stored in memory, which was designed to explain how people (filmmakers) are able to build up complex interpretations of stories based on textual or discourse cues.

Herman's definition is from the filmmaker's perspective; however, most film cognition studies in narrative have either ignored the process of the transition of textual expression (script) to visual and audio information in the silver screen or taken a single opinion about the script. Cutting is the only researcher in film cognition studies who has integrated the four acts script model (Cutting, Brunick, & Delong, 2011). Do most scholars attempt to equate viewers' segmentation to filmmakers' narrative segmentation? If so, questions arise such as how to explain the invisible interpretation of filmmakers' hidden clues among different viewers? Why can we mix the filmmakers' discontinuity work (Cutting, 2014)—segmenting the whole story into different pieces and allocating them into different parts of a story—with viewers' continuity work of perceiving and interpreting information from the screen?

It is important to realize that we explore the differences between filmmakers and viewers in visual-audio information processing for the interpretation and construction of the film, so as to obtain insights on the values and meaning of life conveyed in a film. No matter whether the attention of scholars is on the deep meaning or external language, symbols, or text of the story, they cannot ignore two realities: 1) Film tells a story, and the story is a metaphor for life (McKee, 1997). 2) Film and stories are created by people, and people have both unexpected potential and limitations in thinking and creativity, as well as reading ability. As a Chinese proverb states, "For one thousand readers, there are one thousand

Hamlets.” Similarly, each viewer will have a different interpretation of the same montage technique. Having the same common properties of recognition for this world is a linchpin for understanding the film and human beings, even though there are individual differences in other details. So, it is necessary for scholars to consider how film, nature, and the essential characteristics are combined with the viewers’ perception and interpretation when solving this conflict; this necessitates the help of interdisciplinary research—especially psychology. This issue is also one of the problems that this paper aims to solve. Film, as a highly comprehensive audio-visual art form, comprises a varied and vast array of meaningful components. Despite thorough research, many factors influencing the audience’s experience while watching films are still unknown. Interdisciplinary research will provide both film scholars and filmmakers a new angle to rethink both film and audience. This could then increase the chances of success and decrease investment risk.

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