Journal of The Korea Convergence Society
Vol. 12. No. 10, pp. 189-201, 2021
I-SSN 2233-4890 / e-ISSN 2713-6353
DOI : https://doi.org/10.15207/JKCS.2021.12.10.189

Discussions on the Reconstruction of Visual Illusion in Dynamic Images
- Take 〈Telematic Vision〉 of Paul Sermon as an example

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다이나믹 이미지 예술 중 착시의 재구성에 관한 연구
- 폴 셔먼의 〈Telematic Vision〉을 중심으로

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Abstract The art of dynamic images has experienced three development stages, including experimental films, recording art, and new media image. By introducing all kinds of new materials, new media to the art, and the art of dynamic images has created more freedom for art creation. With the development of digital information technology, dynamic image works have put forward an increasingly high requirement of visual art. The combination of dynamic images and visual illusion can give rise to different forms and expression methods, thus endowing artworks with more vigor. This paper provides an overview by sorting out the lineage and development of dynamic images in the background, as well as understanding the application and performance of contrasted visual illusion. Based on the understanding of the characteristics of visual illusion, we discuss the new characteristics of applying the theory of visual illusion to new media dynamic images in relation to the technical approach of dynamic images. Through the analysis of specific works of Telematic Vision, we search for its reasonable combination and find the appropriate technical means of implementation. We discuss how to use digital multimedia technology and spatial optical illusion to make the design more novel and impactful, and consider how the combination of digital dynamic image technology and visual illusion should be interpreted and applied.

Key Words : Dynamic image, Art, Visual illusion, Creation model, Reconstructed space

요 약 다이나믹 이미지 예술은 실험 영화, 비디오 아트, 뉴미디어 아트라는 세 가지 주요 유형이 있다. 모든 새로운 재료와 미디어를 예술에 도입하여 예술 창작에 더 큰 자유를 가져왔다. 디지털 정보기술의 발달로 다이나믹 영상 이미지 제작에 있어 고도의 시각 예술적 요구가 증가하고 있다. 다이나믹 이미지와 착시 현상의 조합에서 파생될 수 있는 다양한 형태와 표현 방법은 예술 작품을 더욱 생생하게 만든다. 본 논문에서는 멀티미디어 디지털 다이나믹 영상 기술과 착시 현상의 결합을 중심으로 한 공간의 재구성에 초점을 두고 있다. 또한 다이나믹 이미지 개발 맥락에서 시각과 착시의 관계를 살펴보고자 한다. 끝으로 폴 셔먼의 〈Telematic Vision〉 작품 분석을 통해 그 합리적인 결합을 찾아볼 수 있다. 적절한 기술적 구현 수단으로 디지털 멀티미디어 기술을 사용하여 공간의 착시 현상을 표현하여 디자인이 더 새롭고 영향력이 있도록 하였다.

주제어 : 다이나믹 이미지, 예술, 착시, 창작 방법, 공간 재구성

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Received August 19, 2021
Revised October 1, 2021
Accepted October 20, 2021
Published October 28 2021

1. Introduction

The art of dynamic images refers to the art through which contemporary artists make use of modern imaging equipment to create dynamic images for the purpose of expressing their experimental art ideas. Developed on digital technology, the art of dynamic image has brought a new space for free creations of artists and designers. Dynamic image, as its name implies, is to create a dynamic effect for audiences via the use of image materials and animation technology[1]. In other words, in whichever form the dynamic image appears, the dynamic image is an image to audiences at the first sight. Based on that visual elements are the essence of all kinds of images and by integrating other branches of art, dynamic image, a special form of art, has come into being.

Visual communication has been the most important mode of communication in the information society. The appearance of new media has directly affected visual communication, leading to dramatic changes of visual forms and characteristics, communication mediums and content, mediums for delivery of images, and the way how artists create artworks and how audiences perceive these artworks. Meanwhile, along with the development of new media technology, innovations have been popping out. The visual illusion is caused by the physiological and psychological factors of humans as well as by physical factors, such as shapes, light, and colors. As a special visual perception phenomenon, the visual illusion can reflect the difference and contradiction between the information acquired and the practical characteristics of objects that are observed[2]. So far, the visual illusion has been much investigated, which can be divided into different categories, and has found wide applications in the perception field, aesthetics field, psychology field, etc. During the Renaissance period, DaVinci created the masterpiece, *〈The Last Supper〉* Fig. 1, which is known for the strong visual illusion achieved by the use of the perspective approach. In *〈Dynamism of a Dog on a Leash〉* Fig. 2 created by Giacomo Balla in the early 20th century, the artist makes use of the aesthetics of movement and combines the virtual with the real to create a dynamic illusion of a dog running and hopping happily for audiences. Driven by the constant development of digital information technology, audiences have a higher expectation of visual art. This necessitates the research into the visual illusion based on the digital dynamic image. The combination of digital media and visual illusion can give rise to all kinds of forms and expression approaches, thus endowing the design process with more vigor.

Fig. 1. 〈The Last Supper〉, DaVinci, 1494~1498.

Fig. 2. 〈 Dynamism of a Dog on a Leash〉, Giacomo Balla, 1912.

This paper is organized as follows. Section 2 introduces what dynamic images are. In section 3, we explain visual illusion in dynamic images. Section 4 shows Telematic Vision, a work created using dynamic images by Paul Sermon and section 5 concludes the paper.

2. Dynamic image

2.1 Definition and development process of dynamic image

The image has an extensive concept. As long as an artwork, such as film, television work, and photo, is created via photography or photography technologies, it was once defined by different scholars as to the image art, From the 1990s, contemporary fine art circles have used the terminologies, such as “image art” and “dynamic image art”, more frequently, to refer to a specific category of art. Contemporary artists, for the sake of expressing experimental art ideas, have created a series of dynamic image works by taking advantage of the modern imaging equipment. Though different scholars have proposed different definitions for the art of dynamic image, the concept in the fine art circles is completely different from the concept of film and television in the public fields. For example, McLuhan pointed out in 〈Understanding the Media: On the Extension of Human Beings〉 that images are still "the extension of human cognition" and the expression of artists' personal avant-garde thoughts with non-narrative characteristics in terms of creative concept, emphasizing the intersection of art, aesthetics and other disciplines[3]. Another master, Sol Bass, emphasized the behavior of visual rhetoric in his article "Design of the Opening of Films-A New Field for Graphic Designers", including the construction, editing, understanding and cognition of visual images, but talked more about the perspective on dynamic image design related to film narration[4].

In fact, dynamic image is originated from Western countries, which could be traced back to the 1920s. Divided by the production medium, the development history of a dynamic image consists of three stages, namely the film stage, tape stage, and digital stage, and three major types, namely the experimental film, recording art, and new media image. It is apt to say that the dynamic image has never ceased its pace to move forward[5].

In the history of the Western world, Eadweard Muybridge was known for his strong impact on the development of dynamic image design. He established fame for himself by fixing his photographer’s eyes on a series of animals or figures that are in motion. But it was not until he created *〈The Horse in Motion〉* Fig. 3 that he gained considerable fame. In 1870, he used multiple cameras connected by one cable release on a track to take photos of the horse that is in motion. Eadweard Muybridge also invented, *〈Zoopraxiscope〉*, Fig. 4 a projector that projected dynamic images through the spinning of a glass disc. The revolutionary creations of Eadweard Muybridge had a far-reaching influence on design circles, photography circles and the birth of films, and on generations of photographers, film-makers and artists[6]. In the 20th century, the advance of the Industrial Revolution brought earth-shaking changes to people’s life. The prevalence of Dadaism and Surrealism from 1920 triggered the betrayal of traditional culture, and the birth of new branches, such as supernaturalism, in the field of fine art. Spiritually, the interpretation of dreams, illusions, and fantasies was valued. Take 〈Red Desert〉 by Michelangelo Antonioni for example.

The colors are highly ideographical. It is a typical surrealistic and modernistic film. This marked the budding of dynamic image design in film works[7]. In 1932, the Russian Alexander Alexeieff and his wife jointly invented the pin-screen to adapt 〈Night on Bald Mountain〉 into an animation. Availing themselves of the pinhole and the changes of the light, the couple created a classic for the history of animation[8]. The British montage master, Len Lye, not only created colorful effects for the black-white negative films but also innovatively introduced scraping and drawing techniques on films and the bold editing technique - cutting[9]. In the 1980s, affected by postmodernism, more and more artists with a pioneering spirit had gradually realized the significance of the time dimension to the image field, so they sought a combination between digital technology and the art of image design. Relying on the rapid development of communication mediums, the dynamic image could appear in varied forms and find growing applications.

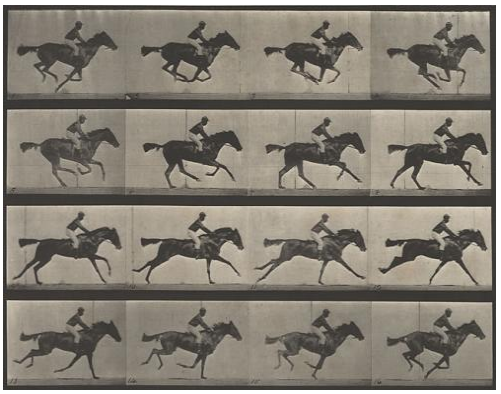


Fig. 3. 〈The Horse in Motion〉, Eadweard Muybridge, 1870

Fig. 4. 〈The Horse in Motion〉, Eadweard Muybridge, 1870

2.2 Characteristics of dynamic image

Even to this date, the main carriers of dynamic images are still the screen, digital network, and installation art. Recent years have witnessed the development of an increasing number of mediums based on digital technology. Audiences can see the information they require at any time and in any place. The communication medium based on digital technology expands the receiving scope of the network information communication exponentially. Therefore, the dynamic image has inherited the extensiveness of digital communication mediums. Besides, extensiveness here refers to not only the extensiveness of audiences but also the extensiveness of applications, which range from the new media to television and film advertisements.

Second, a dynamic image is an integrated form of art. Developed on the basis of other subjects and fields, dynamic image works can incorporate elements from different fields, including visual design, photography, music, interactive design, etc. The final aesthetic effect of a dynamic image work is also an integration

outcome of elements from different fields. These scattering elements are integrated into one dynamic image work to gather different aesthetic effects, which achieves a visual excitement that is unparalleled by that offered by the two-dimensional image design in the past.

Third, following the appearance of digital multimedia image processing technology, a majority of dynamic images can rely on digital technology to synthesize images to create scenes that are beyond the traditional technologies. The images created by digital technology are completely different from the conventional images, such as real-life images taken by cameras or virtual images created by drawing. The images by digital technology can also render virtual scenes that are unprecedented and challenge the imagination limits of the audiences. The popularization of information technology in the field of dynamic image production and its categorization between art and technology symbolizes cooperation between science and art.

3. Visual illusion in dynamic images

3.1 Dynamic image and visual perception

People observe this world and connect themselves with the world via vision. The relationship between observation and image constitutes the relationship of people surviving in this world. Hegel pointed out, from the philosophical perspective, that vision and hearing are cognitive organs.[10] Mankind learns things through vision, which can transcend the spatial distance. Sometimes, people might fail to depict or express some characteristics of an object that are observable by them. Such failure is caused not by people's failure of using the expression language, but that people's eyes and thinking cannot discover concepts that can depict or express these characteristics. "One visual object contains elements far more than the elements covered by the human retina." "The induction phenomenon is by no means rational, nor are the results thus obtained inferred by the pre-acquired knowledge but an inseparable part of a whole object that is directly perceived." [11].

Image works are completed by dynamic vision. The two-dimensional visual effect is achieved via the contrast of shades, colors, purity, and shapes[12]. The visual effect of the dynamic image art includes not only the two-dimensional visual effect but also the visual effect achieved by the moving speed, tempo, and direction of the object. Dynamic images should be reasonably distributed according to different creation themes and plots to achieve perfect visual forms.

3.2 Visual perception and visual illusion

As mentioned above, vision plays an important role in human activities. Humans perceive external objects and acquire different information through vision. Research shows that at least 80% of external information is perceived by vision[13]. The visual illusion is an unavoidable visual perception discovered by mankind in their long-term living and production activities. It is a wrong visual image generated by psychological or physiological factors under the joint influence of the object that is observed and the surroundings. Generally, there are three explanations for visual illusion. The first explanation attributes the visual illusion to the error of stimuli information sampling. The second explanation regards visual illusion as a neurophysiological outcome of the consciousness system. The third explanation examines visual illusion from a cognitive perspective.

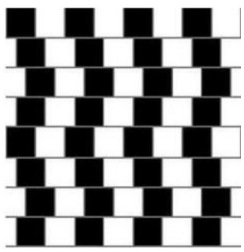
In fact, the discovery and research of visual illusion could be traced back to the 4 B.C. when Aristotle took down the motion after-effects while observing the waterfall. Plato also claimed that mankind could not acquire all true images by avoiding visual illusion. In the following thousands of years, the visual illusion was misinterpreted. Even when the German scholar E. Mach found lateral inhibition at the end of the 19th century, the visual illusion still did not get adequate attention. It was not until the early 20th century when the theory of "*Gestalt*" was spread that research of visual illusion made progress[14].

In daily life, visual perception and visual illusion are regarded by many, including me, as two completely different concepts. In the very beginning, I thought about how to define these two concepts separately. But with the deepening of my research, I found that there is a close connection between the two. In other words, the visual illusion is part of visual perception. Visual perception is composed of visual receiving and visual cognition. But mankind cannot learn the truth without making any mistake, so mistakes or deviations are inevitable in visual perception. In 〈*Visual Thinking*〉 by Arnhem, it says, "I think the cognition activities known as 'thinking' are not privileges of other psychological abilities that are more advanced than the perception. In fact, cognition activities are a basic part of cognition." "I cannot see any reason to stop people from calling things happening consciously as 'thinking'."[15] Arnhem regarded visual perception as visual thinking. Since visual perception is a process of "visual thinking".

Because the visual illusion is unavoidable, we should think about how to make use of it to serve us. Modern artists should avoid the negative influence of visual illusion and make full use of its advantages to create visual fun and artistic charm to enrich the patterns and tempo of humans' visual world.

3.3 Classification of visual illusion

The visual illusion is caused by people's observation of one object by their experience or with one improper reference. This will result in an incorrect judgment of this object.[16] People's psychological factors, such as preconception, might cause deviations or objective conditions that might cause interference, thus resulting in a great gap between observed results and facts. This is actually a fraud caused by vision. With the constant innovation and progress of digital information technology, new types of visual illusion have been discovered. There are also some whose formation cannot be fully explained. After further summary and analysis, visual illusion mainly includes image visual illusion and color visual illusion(Fig. 5, 6).



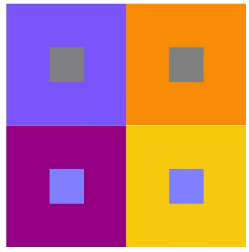


Fig. 5. image visual illusion Fig. 6. color visual illusion

3.4 Visual illusion in dynamic image

The visual illusion is common to see in daily life, and its applications have been extensive. The visual language of visual illusions is, on the whole, consistent with the visual communication language, but their difference should not be ignored.

As the era moved forward and technology developed rapidly, image technology emerged, which could be used to tell a complete story. With the changes in concepts, the non-narrative

dynamic image also gradually entered people's life[17]. The expression methods of visual illusion in dynamic images are non-narrative. This means that this issue cannot be explained directly from the perspective of film and television production which revolves around the narrative of a story. Besides, because of the essential differences between dynamic images and static images, the visual illusion of dynamic images cannot be directly expounded by the static image language. The visual illusion language based on dynamic images should also have unique ways of expression[18].

From the perspective of applications, that visual illusion is applied to dynamic images is based on the screen. For example, the television program and advertising design and package use visual illusion most frequently. In film works, the visual illusion is also used usually as a montage editing approach. Additionally, the visual illusion design based on dynamic images in art design that is based on new media is common to see as well.

3.4.1 Expression of shape visual illusion in dynamic images

The visual illusion of dynamic images, compared with the visual illusion of two-dimensional images, contains one more dimension, that is, the time dimension, which is attributable to the differences between the two. Dynamic images contain the time dimension, which enables them to use new expression forms to achieve more creativity and combinations.

Second, applications of the physiology-based visual illusion phenomena include the stretching of irradiation. For example, in *〈Visual Concepts for Photographers〉*by Leslie D. Stroebel, the "radiation" mentioned in the article[19]. This phenomenon is not subjective imagination but out of the physiological perception of nature. The visual rule can be adopted as a form of visual illusion and applied to the dynamic image design. Therefore, with the passage of time, the factors in the visual illusion phenomenon are changed, and a new visual illusion is generated so that the shape will be closer to the target effect.

3.4.2 Expression of color visual illusion in dynamic images

We are living in a colorful era. As a kind of information that is beyond language, color can arouse audiences' internal emotions. Visual physiology has its own characteristics and limitations. The recognizability of the shape or color will disappear beyond the vision. This is not a substantial change of the shape or color or an accidental visual error but an intrinsic error caused by the specialness of the human visual system. On that basis, a stable visual illusion is formed[20]. Therefore, in dynamic images, two forms of colors are usually put together, with the distance or area between them changed along the time shaft. It is possible that completely different color tendencies might appear. As to specific expression forms, large-area domination and small-area seduction of the images can be arranged to enrich the color changes of the works and highlight the charm of the textual Fig. 7.

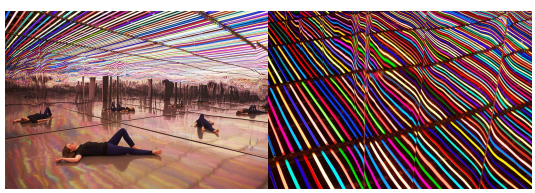


Fig. 7. 〈 An Additive Mix〉, Liz West, 2015

3.4.3 Expression of moving visual illusion in dynamic images

The most striking difference between dynamic images and static images lies in the increase of the time dimension with the former. Dynamic images can move with the passage of time. From the audience's perspective, audiences will first perceive the moving perspective of the space from dynamic images. When heading towards a three-dimensional landscape photo, the deep illusion on the two-dimensional photo is far less real than the perception at a stable viewing distance Fig. 8.

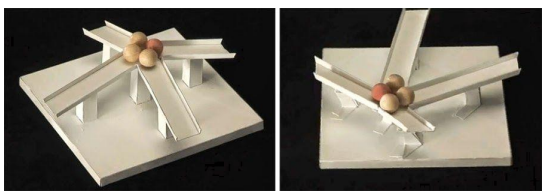


Fig. 8. 〈Impossible Motion: Magnet Slopes〉, Kokichi Sugihara (Japanese), 2010

In dynamic images, if the photographer is used to directly move towards the depth of the scene rather than the zoom lens staying on the original site, the deep illusion thus generated can be more real, and the closer the scene is to audiences, the faster the scene moves[21]. In dynamic images, the use of the moving perspective can casually distort and change the space and moving speed in images so that audiences can perceive reality. Besides, it has something to do with the audiences' psychological expectations. There are many factors that can draw visual attention. The psychologically- expected scenes based on dynamic images can be designed under the time dimension so that audiences will have a sense of novelty.

3.4.4 Expression of virtual visual illusion in dynamic images

In daily life, a mirror of the wall's height can project the objective world, but the world in the mirror does not exist and it is virtual. But in the human eyes, the world in the mirror is a real-world, which is a case of visual perception. Take the work, *〈Dalston House〉*, by the artist Leandro Erlich Fig. 9. This principle can be well utilized by dynamic image works. Digital technology can help project the world which is actually virtual but real in the human eyes. Therefore, even if some virtual objects are added into dynamic images, we might still think it is real. The expression form is not only interesting but also creating a visual illusion for audiences.

Fig. 9. 〈Dalston House〉, Leandro Erlich, 2013

3.5 Reconstruction of dynamic images

Dynamic images and two-dimensional images differ from each other in terms of the time axis. Considering the visibility of dynamic images, it can be seen that time is an outcome that is visually perceived by people, which is the product formatted according to the viewing experience. Time and space are two opposite concepts, but they are closely connected[22]. From a philosophical perspective, the existence of space makes changes to things possible. When audiences are synchronously observing three axial surfaces of an object, audiences can perceive the existence of the space. This means that only when audiences observe the space can

they develop a cognition of space or form a kind of correlation. After the observation is realized through mediums, the way how humans learn space and time is dramatically changed. While observing dynamic images, audiences can look at not only the light, color, and image, but also associate the dynamic images with their static form, distance, and sequence. Dynamic images based on the new technology can help people achieve reconstruction and cognition of the concept of time and space.

4. Telematic Vision

4.1 Production mode of 〈Telematic Vision〉

Paul Sermon was born on 23 March 1966, in Oxford, England. From the 1990s, Paul Sermon has created a series of renowned remote art installations via his own practices. His works, such as *〈Telematic Vision〉*, *〈Telematic Dreaming〉*, *〈The Teleporter Zone〉*, and *〈Headroom〉*, suggest that a majority of his works feature the installation art or images[23]. Audiences can find the artist's tremendous interest in discussing the virtuality and reality in his works and using dynamic images and space to deceive audiences visually and cause audiences' suspicion about their common sense.

〈Telematic Vision〉 is presented in two spaces. For example, the first installation is completed in the gallery space of the museum and the showcase of the Berne Train Station Shopping enter. Space is made up of two blue sofas. Across the space are a large displayer and a small displayer on each side of the sofa. The camera is set to take down audience motions. The dynamic images that are photographed are sent to the video mixer for blending and they are dynamic images are displayed on the large displayer Fig. 10[24].

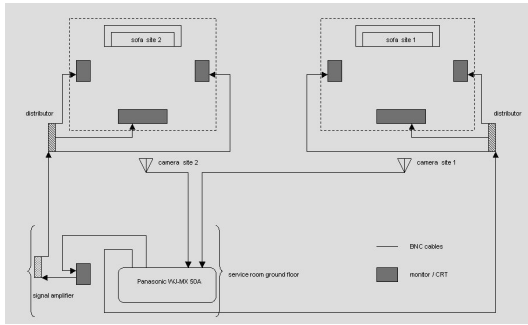


Fig. 10. 〈Telematic Vision〉—Wiring diagram

Two audiences sitting on the blue sofa in different spaces are connected via the camera. When the site dynamic images are delivered, the images displayed can be broadcasted Fig. 11. The audiences from these two places are invited to watch TV on the sofa. Suddenly, they see themselves appearing in the virtual form and sitting nearby the person on the other sofa Fig. 12.

Fig. 11. 〈Telematic Vision〉—Schematic diagram of visiting method

Fig. 12. 〈Telematic Vision〉—Captured images

4.2 Reconstruction of 〈Telematic Vision〉

Based on the exploration of the correlation between the digital dynamic image technology and the spatial perspective visual illusion, *〈Telematic Vision〉* makes use of the digital

multimedia technology for visual illusion in the space so that the work achieves a stronger sense of novelty and impact. The work is full of absurd detail processing and expresses the artist's concern on high technologies and industrialization. As a "persuasive art without texts", dynamic image is creative in itself, but *〈Telematic Vision〉* should not be limited to the surface creation. On that basis, *〈Telematic Vision〉* should maintain its creativity and interactivity. This work aims at capturing the impact of audiences, which is in itself second to none among the variety of artworks.

Fig. 13. 〈Telematic Vision〉, Paul Sermon, 1993

In Telematic Vision, the size of the captured and projected figures directly makes the viewer receive a visual effect of surprise in the midst of the ordinary, and makes people find the fun in the language of illusion in the midst of novelty. Each scene is arranged at a strict distance and size, allowing the installation to challenge the viewer's vision at a particular angle, creating a very "deceptive" image. The creation of dynamic images in the language of visual illusion is all about the very rational method of picture composition, breaking the original flat law and using the principle of dislocation to give people the illusion.

From the biological point of view, we can present light and color in the form of their respective subjects to confuse the visual experience, to achieve the illusion of light and color visual illusion, and the illusion of light and dark is the transition and artifacts in light and color. Deviating from the conventional "texture" perspective of basic materials to grasp light, light and dark colors, can enrich visual perception with a new look. As Steven Holl said: "The different modes of incidence of light, the shadows and shadows produced by light, the transmission, refraction and reflection of light, and the combination of transparent, translucent and opaque states of light, define and redefine space. Light generates spatialization, creating a state of indeterminacy. Light creates a temporary connection between human perception and actual existence."[25] The work illustrates this state of indeterminacy well with projection, breaking this transient connection and redefining the subtle relationship between light and space in the form of a language of visual illusion.

Meanwhile, in this work, space exists ahead of viewers. The human vision constantly explores space. At the same time, space has been constantly enriched and more comprehensively displayed thanks to the increasing visual discoveries of mankind. It is apt to say that the space is visible, but the focus in the space, namely the dynamic image, is ever-changing. Hence, scholars have intensified their research into watching mediums, constantly pursued the transformation of exploration from the visual field to the spatial field, and deepens the communication between the vision and space.

In order to combine different spaces and figures in one image, the work conveys a specific spatial combination in a holistic form. The use of digital media technology orchestrates the space with an association and experience, so that the images can be better captured under the illusionary connection. A web-like structure

extends the possibilities of events. The key lies in the viewer's visual perception and emotional flow to drive the originally static spatial elements to interconnect in the form of conflicting and intermingling illusions. It can be interpreted as a deceptive process of "creating something out of nothing", which is reflected in the change of spatial composition and the fusion and reconstruction in the form of a virtual illusion. The overlapping and interspersing of viewer 1 and viewer 2 are random and accidental, and to a certain extent reproduce the internal process of shifting attention and sequential exposure to visual images under strong visual stimuli in the environment.

Fueled by the development of the Internet, and the advance of games and digital technologies, the viewing subjects have upgraded their role from audiences to participants. This has directly given rise to a new watching identity, digital embodiment. Here, “embodiment” shows audiences’ hope to get rid of the limitations of their body to enter the virtual world. From this world, we can see that audiences have presented a virtual self that is completely consistent with their true selves via photography and projection. The self is reconstructing with the other audience from the other space, thus forming the visual illusion that the two audiences are sitting on the sofa synchronously.

5. Conclusions

In the reconstruction based on visual illusion in dynamic images, the form of visual illusion is the subject of expression, and its visual illusion interest is the meaning. Nowadays, there are more and more explorations of dynamic images, and the ways of presentation are more abundant. Unlike traditional images, which have been confined to a single two-dimensional image, dynamic images allow space to be expanded from multiple dimensions.

From the perspective of creating narratives, traditional images excel in display and lack in narrative, yet in order to have good narrative ability, movies emerge but fail to satisfy the characteristics of display. The means of expression of visual illusion in dynamic images cannot be directly taken to explain this problem from the perspective of film and video production, nor can it be directly elaborated in terms of still images; the language of visual illusion based on dynamic images should have its own unique way of expression.

The work Telematic Vision is a good interpretation of the use of digital multimedia technology with the expression of spatial optical illusion, showing its characteristics and advantages. It proves that the use of visual illusion in dynamic images can give the viewers a deeper impression and bring them a greater sense of visual impact and novelty, so it is necessary to explore the use of visual illusion in dynamic images. It is important to think about how to interpret and apply more works that combine digital dynamic image technology with visual illusion.

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