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Extensibility of Visual Expression in Projection Mapping Installation Art; Focused on Examples and Projection Mapping Installation Artwork Domino

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프로젝션맵핑 기반 영상 설치 미술의 시각적 표현 확장성 -사례 분석 및 작품 〈Domino〉을 중심으로-

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Abstract Recent advances in new media for sensory experiences keep expanding visual expression methods in installation art such as projection mapping and virtual reality. Artists can create and develop visual expression techniques based on such new media. Projection mapping is a new medium that continues to add various possibilities to visual expression in media art. Under the projection mapping environment, artists can recompose the object or space with the digital content by projecting video onto three-dimensional surfaces in the space. This paper focuses on the process where visual expression with the projection mapping technology leads to viewers' sensory experience. To this end, "reproducibility," "dissemination," "virtuality," and "interactivity" of media were analyzed to describe the meaning and *definition of visual expression. Artworks are considered as an example to study visual expression techniques such as "repetition and overlap," "simulacrum and metaphor," and "displacement and conversion." I applied the analysis and created Domino, a projection mapping artwork, which helps the research on visual expression techniques that can lead to sensory experience the extensibility of visual expression.

Key words : Projection mapping, Media art, Visual expression, Media, Extension of perception

요 약 최근 센서 경험을 위한 새로운 매체들의 발전은 프로젝션맵핑, 가상현실과 같은 비디오 설치 미술의 시각적 표현을 더욱 확장시키고 있다. 예술가들은 새로운 매체들들 통해 새로운 시각적 표현 기법을 개발하고 발전시킬 수 있다. 프로젝션맵핑 기술은 지속적으로 미디어아트 작품의 시각적 표현에 다양한 가능성을 부여하고 있다. 본 논문은 프로젝션맵핑 기술에 기반한 시각 표현이 인간의 감각 체험으로 전이되고 확장되는 과정을 연구하기 위해서, 매체가 갖는 '복제성,' '전파성,' '가상성' 그리고 '인터랙션'의 특징을 분석함으로써 시각적 표현을 정의하고 의미를 기술하였다. 작품 분석을 통해 '반복과 중첩,' '시뮬라이크롬과 은유,' '치환과 전환'의 시각적 표현 기법에 대해 분석하고, 프로젝션맵핑 작품인 〈Domino〉에 적용함으로써 시각 표현 기법이 인간의 감각 체험으로 확장되는 과정을 연구하였다. 시각적 표현의 확장성 연구는 작품을 제작하는 예술가들이나 관람하는 관객들에게 작품의 의미를 전달하거나 해석하는데 필요한 핵심 요소이다.

주제어 : 프로젝션맵핑, 미디어 아트, 시각적 표현, 매체, 인체 지각 확장

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1. Introduction

1.1 Research Background and Objectives

With continuous advances in digital technology, cutting-edge media devices such as computers, cellphones, AR/VR, projectors, and AI are becoming an inseparable part of our daily lives. New media can be used as a new tool for visual art. Therefore, expansion of media means more tools for artists. Projection mapping installation is one of the ways to express new media art. Projection mapping installation allows artists to change their artwork in real-time by combining objects and videos projected in the same space. As the surroundings on the site and objects for projection are used as a medium for the artwork, the audience can enjoy the experience that combines various senses such as vision, hearing, and touch in the art place created by the video and installation. Projection mapping, a tool to express artistic concepts, can expand the space for production and expression of video installation and boost visual expression capacity. This paper aims to define what characterizes projection mapping in terms of visual expression by analyzing projection mapping artworks Furthermore, this paper defines visual expression methods of projection mapping installation art, while presenting production direction and aesthetic perspectives from the artist's point of view. That offers new opportunities for interesting and valuable forms of expression.

1.2 Content and Methods

This research starts by studying the different characteristics of each medium. It analyzes the relationship between feature, type, and concept of projection mapping, which is followed by case studies of projection mapping artworks focusing on visual expression. Based on the case study, a new projection mapping artwork was created to be compared with existing artworks. Last but not least, the extensibility of visual expression in projection mapping is defined.

The body part analyzes visual expression methods of projection mapping. Chapter 2 describes the research background, objectives, and implications and defines the scope and methods of the research. Chapter 3 summarizes the concept and categories of projection mapping installation and explains how the extensibility of visual language is interdependent on the characteristics of different media and techniques. Chapter 4 shows the characteristics and meaning of visual expression methods extended by "reproducibility", "dissemination", "virtuality", and "interactivity" of various media and techniques. Based on my own projection mapping artwork, characteristics, types, and the concept of visual expression are explained from the producer's point of view and conducts inductive analysis on relevant artworks focusing on visual expression. The last part summarizes the features of extended visual language in projection mapping installation and presents a future direction of development in the field of video installation art.

2. Consideration on Extensibility of Visual Expression

2.1 Concept and Categories of Projection Mapping Installation Art

Projection mapping, an important art form in new media art, has risen as a major form of an exhibition in modern art. Combining video art and installation art, projection mapping has developed into an art form that enables unique visual expression. As each different medium results in different visual expressions in installation art, artists can use the projection mapping technology not only to express the

video content in more various ways but also to extend visual expression.

Projection mapping art consists of two parts: video art where projectors are used as the medium, and installation art. Video art conveys messages, ideology, ideas, and others intended by the artist.

"Video art elicits empathy and interpretation from viewers' experience by providing clues to visual thinking and interaction, and by connecting symbolic meaning that comes from video, it leads to a more specific and complete concept. Artists are the ones who create the video, and the content is delivered based on non-linear expression techniques. The objective is not to let viewers know "what it is," but to make conversation"[1].

Installation art means that artists select an everyday object to utilize, modify, combine, and deconstruct to create a completely new form. The combination of video art and installation art in projection mapping gives birth to a new form of art. Projection mapping installation art is an art form in which the projector is used as the medium, installation as the major tool, and video as the means in a set place. The audience can enjoy an experience of multisensory interaction in the space for imagination, as visual, auditory, and tactile senses are reinforced altogether. The composition mainly includes selected video content, graphic or image, projectors, and mapped objects[2]. Projection mapping programs can be used to give optical illusions by mapping the video onto the surface of irregularly shared objects using projectors and link protocol. Mapped content is usually a combination of video and audio, and it enables audio-visual synchronization and storytelling as the audio helps create a dynamic effect of the video. Artists reflect their artistic ideas through objects and projection mapping, and they enable the audience to interact with the artwork in the virtual place[3].

First, immersion. Architectures, public places, or indoor spaces are used as the medium, and pre-programmed video or image is projected onto the object or the surface. With beam and sound, it offers an immersive experience to the audience, as seen in Fig. 1[4].

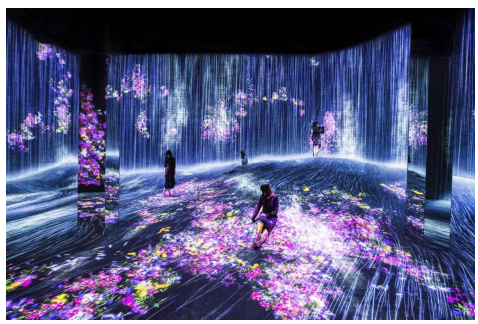

Fig. 1. Teamlab, 〈The Columns〉, 2019.

Second, VJ'ing. Projection mapping is widely used in venues such as concerts and music festivals. A combination of sound and image creates physical hallucinations, and viewers engage in interactive activities. It shows commercial qualities when used in stage performances and advertisements as shown in Fig. 2[5].

Fig. 2. 24 Hour Pixel People - VJing and Visual Performance Documentary, 2013

Third, theatrical. Projection videos are pre-programmed and played in a set order in

combination with acting or stage performance for interaction and narration as seen in Fig. 3.

Fig. 3. Video Mapping Japan

Fourth, static/interactive. It is programming, monitor, infrared sensor, motion capture system, and other technologies that invite the audience and the environment to interact with the static objects for projection. Fig 4 shows an example.

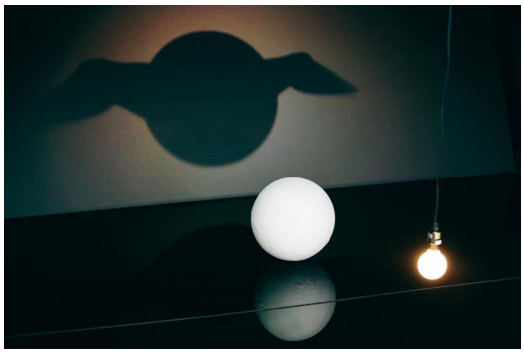

Fig. 4. Sang-won Leigh, Asta Roseway, Ann Paradiso, 〈Remnance of Form〉, 2017

Where a generally long segmented show is present as a single fluid video. video is mapped onto an object that is not interactive and plays from beginning to end. and it shows the idea of the artist rather than interacting with the audience.

2.2 Analysis of Extensibility of Visual Expression with Different Characteristics of Media

Nowadays, the trend in new media art is to move away from traditional easel painting to digital electronic modes such as the computer, projector, sound device, or sensor. In terms of the technique of creation, new media highlights the process of combination and interaction with the audience, rather than only focusing on art technique or simple outcome. With regard to artistic concepts, new media can disseminate art more broadly, contributing to the popularization of art and getting people to connect artworks with their daily life. Projection mapping installation has its own characteristics. The media of projection mapping enables dissemination and reproduction, and the technology has interactivity and virtuality. As the media and technology of projection mapping have such traits, the methods of visual expression are expanded with broader experimental space.

2.2.1 Expansion of Dissemination

"When an artist is to deliver a piece of art digitally, the artist may either produce the artwork in a way that better suits the digital medium or reject dissemination by making it difficult to be reproduced. However, almost everything can be reproduced with modern technologies[6]."

This clearly points to the fact that digital media is distinguished from traditional art because of its characteristics of dissemination and reproduction. In view of the means of dissemination in traditional art media, the methods of creation are calligraphy, painting, and sculpture, and the methods of art appreciation are viewing and watching. The tool or route of dissemination is through art museums, galleries, and libraries that have certain spatial limitations for dissemination. On the other hand, projection mapping installation has different means of media dissemination. Projection mapping installation art is about

combination, connection, and creation using the computer, rather than making a sculpture or painting on paper, canvas, soil, stone, or wood. Art appreciation focuses on touching, feeling, experiencing, participating, interacting, and engaging in other sensory experiences, along with viewing and watching the artwork. For better dissemination, artworks can get out of the exhibition hall to be displayed and disseminated in public places or outdoors like fairs, parties, malls, shop windows, or bus stops. Aesthetic ideas in projection mapping are similar to those of traditional art, but the essential difference comes from characteristics of dissemination. Traditional works of art and the audience are fixed and independent of each other, but the video content of projection mapping art can disseminate the work more dynamically, combined with the spatial environment and background. This dynamic dissemination is important, as dissemination means communication and exchange and brings the artwork closer to the audience. Furthermore, the characteristics of media dissemination can expand spatial expression.

2.2.2 Expansion of Reproducibility

It was actually possible to reproduce artworks before digital technologies were developed. After the Industrial Revolution that gave birth to photography and video technology, however, we no longer need the record-keeping function of painting. The aim of artwork was changed into pure artistic appreciation, and the dissemination function was replaced by photos and videos that can be reproduced. “Reproduction” is the main concept along with “Aura”, in The Work of Art in the Age of Mechanical Reproduction by Walter Benjamin. Walter Benjamin cited “Aura” as the main standard that distinguishes traditional art from reproduced art and argued mechanical reproduction allowed broader dissemination of artworks by going beyond the time and space constraints of traditional art appreciation. Although the aura of the original work may disappear after reproduction, the reproduction technology made it easier to disseminate traditional artworks. Better reproducibility of new media led to changes in the way of art dissemination, and the scope of dissemination was enlarged. As a result, art was popularized, thereby expanding methods of visual expression and aesthetic approach[7]. Photography made artworks reproducible, but the original work and the reproduced work still had some differences. However, the advent of projection technology completely got rid of the difference. When artists produce a projection mapping installation artwork, it can be perfectly reproduced without any error or difference from the original work. Reproducibility is the major characteristic of projection mapping installation art. In the visual aspect, the reproducibility of digital media brought more room for imagination when artists create artwork. As video content can be backed up and recycled, artists can experiment and realize various ideas in creating their works. In addition, in terms of visual expression, reproducibility creates space for artists to explore and experiment with new visual expressions. Artists can reproduce the material using beam projection technology and video content. Based on the reproduced material, artists’ intentions can be freely expressed by using visual expression techniques such as combination, cropping, repetition, overlap, collage, blocking, appropriation, augmentation, and diminution. Reproducibility of media expands the repeatability of visual language in projection mapping installation.

2.2.3 Expansion of Interactivity

"Interactivity" is an important technical feature of projection mapping installation. This is also the key element that extends the visual language. The term "interactivity" refers to the interaction between humans and objects. Roy Ascott, a pioneer of new media art, said that the most distinctive feature of new media art is its connectivity and interactivity. He added that to understand the visual expression of media artworks, we need to go through the following five steps: connection, convergence, interaction, conversion, and empathy[8]. Instead of just watching from a distance, the audience can first immerse themselves in the work and interact with it, which changes the way of visual expression. In this process, the consciousness of the work and participants change, creating new videos, relationships, ideas, experiences, and visual languages. The interactivity of projection mapping art reshapes the distance between the audience and the work and the physical and psychological distance, thereby inviting the audience to be part of the work in the interactive process with the artwork. Interactivity in projection mapping installation art is also crucial for visual expression. Artists can use immersive experience, visual conversion, and artistic concepts for creation based on technological features with computer programs, sensors, projection equipment, behavior or movement of participants, program tools, posture, sound, facial expression, or temperature. Such interactive features can connect the artwork with the audience, which ultimately reinforces communication. As participants become immersed in the artwork, the visual language expressed by the artwork forms the entire aggregation: the artist, the artwork, and the audience. As mentioned above, the components of projection mapping installation converge together, as with elements of traditional art such as the formation, color, and composition. The feature of interactivity was added with changes in media features. Interactivity broke the barriers between the audience and the artwork in terms of appreciation and communication, and “communication" with the visual language was also expanded in the process of communicating with the audience.

2.2.4 Expansion of Virtuality

The most essential feature in projection mapping art is virtuality, which mainly refers to the virtual feature of content for projection, art media, and the artistic subject. Concerning the virtuality of content, what is expressed with the projection technology is not the representation of the real world, but the digitization of how the artist symbolizes the physical world and human psychology. Jean Baudrillard (born July 29, 1929—died March 6, 2007) noted in his book Simulacra And Simulation that symbols lost relevance to imitation and reconstruction, and people are living in a virtual world of artificial symbols. The virtual world, a unique product of postmodernist society, is a surreal and digitized graphic, and its main characteristics include simulacre, constructivity, reproducibility, and simulation[9].

While conventional media of art was tangible paper, cloth, wood, stone, metal, and others, media artworks are virtualized in projection mapping through computer language, projectors, network, infrared sensors, motion capture equipment, video, voice, and other digital media. Uniqueness and originality of art can be achieved by “reproduction” and “backup” with digital media. Likewise, the unique texture and aesthetic properties of artworks are represented with virtual digital media. It especially becomes

noticeable when light is used as the medium of a projection mapping installation, and not only artistic information but also the visual expression of the work is all virtualized.

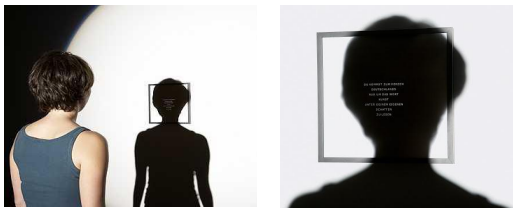

Fig. 5. Gonzalo Diaz, 〈Eclippsis〉, 2007

The projector beam expands the space for virtual visual expression and virtualizes the artistic subject, at the same time. Projection mapping art replaces the unilateral delivery of artwork in traditional art with "two-way interaction" among the artist, participant, and the artwork. Virtuality of the content for projection leads the audience to become a spectator, participant, and second creator of the work. For instance, as shown in Fig. 5, German artist Gonzalo Diaz got the audience to stand near his work Eclipsis at the documenta international art show held in 2007 in Germany and blocked part of the light. The shadow of the audience made inside the small square helps people read the text. The audience's body becomes a crucial part of the work since the letters do not appear clearly without the shadow of the audience. The existence of the audience and their shadow makes the work complete. The content, medium, and subject are highly virtualized, and the intention of the artist can be clarified only in certain conditions. Virtuality of the artistic subject gives dual meaning to the work, and the audience can interact with the work, think, and understand in their own ways. In this process, virtualized interaction between the work and the audience provides simulacrum and extends the metaphor for visual expression.

3. Definition and Examples of Extended Visual Expression

3.1 〈Time Left〉, Example of Repetition and Overlap

Reproducibility of media can be the basis for the expansion of visual expression in projection mapping art. Beam projection and video content are utilized for reproduction, and the copied contents are juxtaposed, overlapped, and connected. Expanded visual expression is defined as "repetition and overlap." Repetition means a spatial composition where the same component appears at least twice in the same space[10].

Repetition and overlap are represented mostly in two ways.

First, in the process of creation, the artist can repeatedly arrange and combine the art material and continue the repetition. The artist can attract viewers by using images that have repetitive tension and visual stimulation.

Second, as the visual language for art creation, is repeatedly expressed, the artist can utilize multiple conversions to switch the existing material and give the recurring explanation.

Fig. 6 shows Time Left by Israeli artist Michal Rovner that repeatedly arranged the same dynamic image of a small person and combined them in various styles. The artwork is a projection image of endless rows of the black shadow of a small person arranged in dense arrays of horizontal lines all over the walls in a dark room. The small person in the video repeats the same motion, but it does not seem to move forward. As in Fig. 7, by playing the mapped video across the room with a projector, it induces viewers to think whether the person in the video is a prisoner behind the bars, a pedestrian walking down the streets, a soldier heading to a battlefield, a herd of ants on the

move, or viewers themselves in the crowd. The image in the artwork does not specifically refer to the identity, time, and place, but such a lack of details gets the audience to think of their existence and its value. French aestheticist Mikel Dufrenne (1910-1995) noted that repetition is a must in expressing movement with rhythm[11]. The method of repetition and overlap can give an impression of mechanical reproduction, and the redundancy and rhythm brought about by repetition can further emphasize the artist's subjective sense. Time Left uses this repetition and overlap to expand the space for imagination when the audience interprets the work of art, while magnifying visual tension and impact.

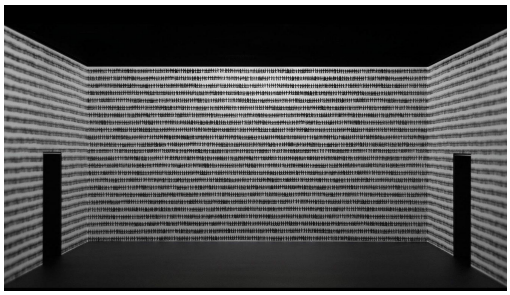

Fig. 6. Michal Rovner, 〈Time Left〉, 2002

3.2 〈Star〉, 〈Date Zone〉, and 〈N E O S〉, Examples of Simulacrum and Metaphor

Projection mapping installation art, based on the expanded virtuality of media, demonstrates a visual expression method that expands the empathic capacity in virtual and real space, and it is described as "simulacrum" and "metaphor." Simulacrum and metaphor are also known as imitation and metaphor. These are expressed mainly in two ways. First, the artist produces a virtual artwork imitating the features of real-world objects and performs conversion in various ways. The artist can lead viewers to relate to the work by illustrating defining characteristics of objects through unique visual language. Artists build a new virtual reality in the object, which is similar to reality, and encourage viewers to feel the emotions they have in the real world. Simulacrum can lead to the empathy of the audience as its visual expression method is about linking the objects and images in the work with actual emotions that people have in reality. The nature of Simulacrum reflects our ability to relate to objects in our subconscious mind.

Fig. 7. Tony Oursler, 〈Caricature〉, 2002

American artist Tony Oursler has focused on the impact of information on our emotions in this digital society and on the relationship between the real world and the virtual space generated by digital media[12]. It is also the source of his artistic ideas. Oursler often uses projectors as a medium to produce experimental artworks in which sound, performance, video, and sculpture are combined to create features of the human face and human emotions are used as the artistic material. The virtual images of these artworks evoke empathy in the audience as seen in Fig. 7.

In his work Star, Fig. 8, Oursler dismantled the human eye and mouth and reconstructed the entire image into a petal shape. The twisted and awry face implies distorted multiple personalities. Oursler conveyed a message of serious mental collapse and simulated practice through the visual expression of Simulacrum and metaphor in its overall form.

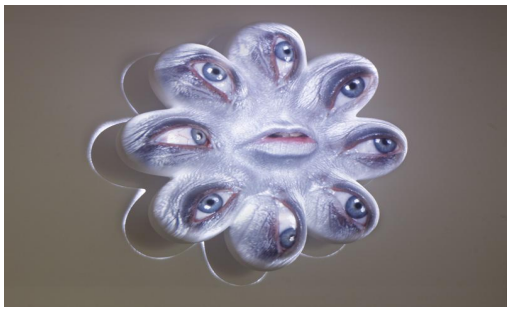

Fig. 8. Tony Oursler, 〈Star〉, 2007

Fig. 9. Michal Rovner, 〈DataZone, Culture Table #3〉, 2003

Fig. 9 shows Data Zone by Israeli artist Michal Rovner, where she reduced a herd of human-shaped shadows into a tiny figure like a cell or bacteria that could be seen through a microscope and projected the image onto a bacterial culture plate. Rovner brought objects that go unnoticed in our daily lives to be reborn as a new life form based on her interpretation of life so that viewers can reflect on themselves. It translates an uncommon virtual image into a figure in ordinary surroundings with concrete materials using Simulacrum and metaphor. As a result, the artwork gives a unique impression and empathy to viewers, while realizing a clear contrast of the virtual world.

Korean media artist Unzi Kim's N.E.O.S in Fig. 10 is composed of a three-dimensional cube. It is a three-dimensional installation with a video of people inside a translucent acrylic box. The video was taken with four cameras and played in the exhibition hall on a white cube screen of the same size with four projectors. The figure of the people inside the cube is reflected in four walls as a shadow. The depth of presence that comes from the shadow merges with the three-dimensional sense of space, leading to simulation. It is a semi-three-dimensional video art that utilizes reality obtained by removing the obstacles to experiencing a three-dimensional feeling[13].

Fig. 10. Unzi, 〈N.E.O.S〉, 1997, 4 Projections for Projection Mapping

3.3 〈Bubbles〉, Example of Displacement and Conversion

Projection mapping installation recreates the representational object in the 3D world, moving away from the conventional dimension of artistic visual expression and perception with interactivity, thereby changing the general perception of virtual space. The way art is appreciated has also changed as projection mapping incorporates "interactive" features. The existing way of simply appreciating traditional art was changed into participation, experience, and interaction, and viewers became part of the work. The interaction between the audience and artworks has become an indispensable element in works of art, as images produced by artists need viewers. Interactivity establishes transition effects of spatial visual language, and such

method of visual expression is herein defined as “displacement” and “conversion.”

“displacement” and “conversion” indicate that the artist’s replacement of a real-world object with a virtual image results in a transition in the perception of the audience. For example, in the sound and video installation Bubbles in Fig. 11 by Wolfgang Munch (1963), a projector casts bubble images onto the screen that appear to float in real-time, creating musical interaction with viewers. The projector projects a beam of light onto viewers to create a shadow, and the shadow can blow off the bubbles on the screen by hitting them if they want as shown in Fig. 12. In other words, participants’ movements can blow away or burst the bubble on the screen. The bubbles identify the shadow’s contact and its direction, and the action of the bubbles defines the behavioral rule of the participant. The audience in the real world realizes spatial displacement and conversion through their shadows and virtual bubbles and conducts interaction activities. As seen in this example, in the process of continuous interaction between the work and the audience, video mapping art extends the limits of spatial displacement of visual expression based on the features of interactivity.

Fig. 11. Wolfgang Münch, Kiyoshi Furukawa, 〈Bubbles〉, 2000

4. Analysis on 〈Domino〉, the Application of Extended Visual Expression

4.1 Expansion from Repetition and Overlap to Enhancement of Feeling

Visual language in Domino is expressed in a deep and enhanced manner by repetition and overlap. Emotions are our attitudes and reaction to objects or objective situations. Art is a typical way to express feelings, and an artistic expression of emotions does not mean representing them in everyday forms, but through artistic techniques in the work. American symbolist and aestheticist Susanne K. Langer, in her book Problems of Art, defined that art as a visual language that expresses human feelings and can be transformed by emotions[14]. The overall use of repetition and overlap deepens the inner thought of the work. The repeated language of facial movement and the glass bottle on display reflect the repetition of the installation space on the video. The work generates tension and visual impression where the object constitutes the whole and the entire work surrounds the entity, by repeating the images and sound and incorporating various repetitive elements. The repeated tension and visual impression effectively extend the emotions to be strengthened in the projection mapping installation.

Fig. 12. BinZhou Fang, 〈Domino〉, 2018

4.2 Expansion from Simulacrum and Metaphor to Empathy

Selected materials and video content are all unique visual expressions of the artist in creating video installation art, and such expressions serve as symbols for the artist to engage with the audience through artworks. Simulacrum and metaphor get the audience to think about the artist's intentions in the process of creating such communication symbols. When artists imitate objects in our daily lives or people's experiences and feeling, they can find inspiration for visual language, namely simulacrum, and metaphor. Artists can imitate our objective cognitive experiences by building a virtual world that is similar to reality, and metaphors can get viewers to relate to the artwork[15].

Domino talks about disconnected communication between people caused by digital media through the visual language of Simulacrum and metaphor, getting viewers to reflect on themselves. When viewers approach the work, the real-time camera recognizes the face and projects the image onto the glass bottles. The symbol of the glass bottles is modern media such as cell phones, computers, AR, and VR, and viewers reflected in the bottles appear to shake their heads as if they are stuck in it, suggesting a lack of emotion, thought, or communication.

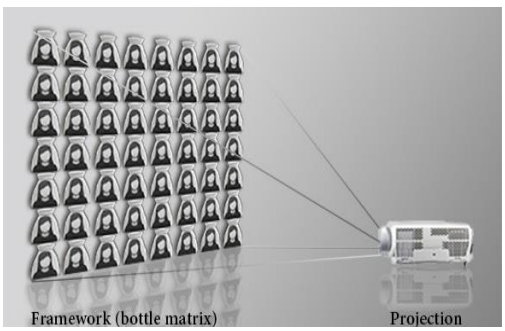

Fig. 13. BinZhou Fang, 〈Domino〉, 2018

The World as Phantom and as Matrix by Gunther Anders also addresses the disconnection between people and technology. The way of communication between people began to shift after the release of television in the 20th century. Television epitomizes disconnection rather than communication, as people who used to interact and exchange with each other around the table now watch the television. Television took the time for communication, which led to disconnection. People passively watch TV and become immersed in the illusion of being projected. Increasingly, individuals don't need an exchange, so they break off their interactions with others and the world. If television was the media that caused the disconnection represented in the work of Anders, mobile phones would be the major reason that causes the disconnection of today, and messenger plays the greatest role among others. Since more and more people use messengers for social interaction, messenger exchanges replace offline meetings, causing silence in modern society. In Domino, simulacrum, and metaphor, or the visual language, copy and reconstruct "mirror" through which viewers relate to disconnection and reflect upon themselves.

4.3 Expansion from Displacement and Conversion to Spatial Presence

The extensibility of displacement and conversion can be reinterpreted by the concept of "spatial presence" in the field of media psychology. Spatial presence can be defined as the subjective feeling of "being there" that media users feel in virtual space, and it is media users' observation of the location of their body in virtual media space. Researchers say that spatial presence is a conscious experience or feeling, and Lee, S. K., Kim, G. J., Rizzo, A., and Park, H.

defined that it is a state of mind in which virtual objects are detected as substantial objects by a sensory or non-sensory manner[16]. As previously described in Chapter 4:3, displacement and conversion add interactivity depending on the technological characteristics of the media. The audience feels interaction between objects in the real world and virtual images through works of art, and this process extends the perception of viewers. Maurice Merleau-Ponty argues the human body can be extended by an artifact, and our perception can also be extended by the "body" of the artifact. Perception is extended regardless of the shape of the body or the skin surface. Perception is extended by acquiring sensory ability, stretching the breadth and scope of tactile sensation like a blind man walking with a stick [17]. In Understanding media: the extensions of man, the author Marshall McLuhan stated that a medium is an extension of our sensory organs and has an impact on our relationship with the surrounding world[18].

Based on such a theoretical analysis above, the visual language of displacement and conversion was applied to Domino. The camera captures viewers' faces in real-time, and the image is projected onto the glass bottles based on projection mapping technology. It forms a virtual image and virtual space, converting the viewers into an image on the bottle. Here, the perception of the human body is expanded to the virtual space through media like the real-time camera, projector, computer (which is the extension of perception through artifacts mentioned by Maurice Merleau-Ponty), getting viewers to feel "spatial presence." When viewers are in the state of spatial presence, the perceived location of their body is converted from the real world to the virtual space by virtual media, so the viewers feel that a virtual image is an actual object in a sensory manner. As a result, the body gets a new sensible perception. The new sensible perception can be translated into "embodied cognition," a concept based on the philosophy of phenomenology and philosophical psychology. Embodied cognition refers to the strong link between physiological experiences and psychological state, and it is understood that physiological experiences can activate psychological state.[19] Embodied cognition is crucial for the body in realizing the perception highlighted by spatial presence, and it has significance in the following three ways:

(1)The way and procedure of sensible cognition are determined by the body or physical properties of the medium.

(2)The content of sensible cognition is provided by the body and the media.

(3)Sensible cognition, body, environment, and media are all integrated; sensible cognition exists in the brain, and the brain belongs to the body which is affected by media.

Take the example of Domino, where the audience and the work communicate in the visual language, which is displacement and conversion. Once the medium, or the artwork, begins to interact with the body, the body affects the brain, and the brain extends perception through media and communication environment. Ultimately, the state of spatial presence can be achieved. At this time, the spatial perception of viewers is expanded to a non-material form. In summary, when the visual language of displacement and conversion is applied to projection mapping art, viewers can experience spatial presence, and it can expand the limits of visual expression in terms of expressing psychological state.

5. Conclusion

This paper focuses on the extensibility of

visual language in projection mapping installation art with changes in media features. The features can be grouped into media features and technological features. Media features are again categorized into those of dissemination and reproduction, and technological features into interactivity and virtuality. Specific characteristics of "interactivity," "virtuality," "dissemination," and "reproducibility" were analyzed to derive an extension of visual language utilizing projection mapping installation art: "repetition and overlap," "simulacrum and metaphor," and "displacement and conversion."

"Repetition" and "Overlap" are visual expression methods extended by "reproducibility." Artists repeatedly combine and arrange artistic materials, and the materials are overlapped and narrated again in order to build overall visual tension.

"Simulacrum" and "metaphor" are ways to express visual language extended by "virtuality" of media. Simulacrum and metaphor mean that artworks simulate selected features of an actual object around us to rebuild it as a virtual reality. As virtual reality looks similar to the real world, it can take the audience back to their actual experiences. Simulacrum has a differentiated expression from traditional art in that it is about linking objects and images in the artwork with viewers' experiences of real-life objects, so that they can relate to the work. Simulacrum essentially reflects our ability to subconsciously relate to objects.

"Displacement" and "conversion" are methods of visual expression that add "interactivity" to features of media. Displacement and conversion connect objects with different concepts that exist in two different dimensions. The audience in the real world and the artwork in the virtual space begin to interact, as two separate factors are brought together.

Analyzing the impact of using different media features can help us understand the extensibility of visual expression. Media artists opt for new media with technological advances, so attributes of not only the technology itself but also media should be considered when we study visual expression methods. Also, we need to make comparisons of visual expressions in the bigger context of postmodern art.

Visual expressions in traditional art and new media art all have the same objective albeit different in the method. That is to achieve exchange between art and human. Visual expression is a communication link between us and artworks, and new expression methods will emerge along with advances in media. A study on the extensibility of visual expression is expected to help artists and viewers in producing artworks and in delivering or interpreting the meaning of works, respectively.

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