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Architecture_Speaking in Colors

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Abstract

Building skins are expanding even beyond their functions as a simple boundary between the exterior and interior and into the realm of linguistic functions thanks to the development of media art. LED has been used as material on outer walls following the advancement of building materials, so the outer skins of large buildings are evolving into a messenger of language capable of communication. In big cities, buildings send out video images to enable communication between people and architecture, which plays a huge role in determining the identity of a building beyond simple advertising. Such media façade technologies can be understood based on the concept of outer skin change, which refers to the idea that animals change the colors or textures of their skins to show their various states. In addition, various message delivery functions in human clothes should be included in such a discussion. We need to research on the possibilities of seeing media facades for their information delivery function and expanding them into information delivery between buildings as well as just between buildings and people.

Keywords: *Architecture, Media facade, Urban media, Projector, Keystone, Multi screen*

1. Introduction

Some animals use their skin to show their current state and communicate with others. Their colors work to cover up their bodies, represent the growth of their bodies, and express their emotions. Animals with protective coloration have developed it by trying to adjust to their environment, having similar skin colors to their environment in most cases. Protective coloration is a means of life for them, and humans find such a function in clothes. Clothes protect people from the environment; at the same time, they state status and level and create a new language with different types of texts and colors on them. Clothes have their value fulfilled when people complete the act of "putting them on." They do the primary linguistic act by putting on their clothes in their own rooms. When people become active social members in their clothes, the function of their clothes expand further due to the performance of language. Animals use colors to express their emotions that can be very different from human emotions. The ultimate difference between them is that humans change clothes instead of skin color. This explains why clothes are used as a tool of language and called a second skin. People convey

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their language with clothes, which requires an aesthetic language based on colors, designs, and styles for the delivery.

As people complete their language by forming social relationships with others, human clothes have expanded their functions as a tool of communication to influence their social relationship with others beyond the simple protection of their skins [1]. Like the protective coloration of animals and the fashion culture of people, buildings are expanding into the architecture of creating various environments beyond the function of dwelling. Building skins minimize the impact of external factors including winds, sunlight, and natural disasters and enable the living of people as their primary functions. In addition, they also function to communicate with their surrounding spaces, becoming an independent structure to change urban landscapes.

A media façade on the exterior spaces of building, roads, and public facilities does a linguistic activity like the skin colors of animals and human clothes and requires several technological conditions according to the inside skin structure hidden under the outer skin. In modern urban spaces, building skins move further from their significance as building materials and change their meanings to encompass information, communication, and exchange [2]. The designs being made today indicate that building are moving toward architecture as mass media. They could be called architecture conveying information or making a speech via the digital signal technologies of new media.

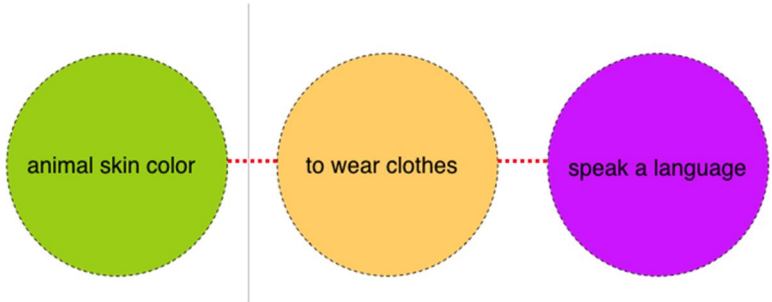

Figure 1. the link between the skin and language of animals

2. Analysis of Media Façade Types

Media façade technologies are categorized according to the method of communication with the outside. They should hold the significance of existence fit for their communication needs. That is, the effectiveness of such technologies depends on the degree of linguistic expressivity in legitimacy (why do they communicate?), need (reasons for communication), and continuance (how do they continue their communication?) for media facades to communicate with the outside. Media façade technologies should be selected for various reasons according to these criteria.

Table 1. Categorized by condition of the media façade

Building – Urban.	Expression of Identity
Building – Environment	Protection and control
Building – Respondent	Cognition and reaction
Building – Landscape	Adaptation and Harmony

In addition, they should be functional in the building structure including architecture, design and construction. It would be desirable to judge and design within the structural scope of their functions. The different shapes of building sides where LED is installed including planar and curved ones and demand different linguistic environments. This is similar to animals changing their skin colors and humans coordinating their clothes for their bodies. Technology should be determined according to the effective delivery of this language or not. In most cases, LED installed outside is exposed to the environment of water, humidity, and heat all the time and is accordingly in desperate need of proper building finishes, which should perform both aesthetic and linguistic functions. The structure of LED installed for separate purposes from the structures and shapes of outer walls is similar to that of electronic displays that exist separate from buildings. They may perform the functions of the medium of language, but the linguistic functions of buildings themselves may become weak. They will be nothing but advertising monitors separate from buildings rather than building skins. There are some examples of building skins made according to the language delivery styles of media facades: the Millennium Park that is a rooftop park in Chicago; Dexia Tower in Brussels, Belgium; Chanel Tower in the Ginza of Japan; and the Galleria Department Store ″WEST″ in Ven Ban Berkel.

In Figure 2, designed by the architect Frank Owen Gehry, the Millennium Park has walls made of LED panels like bricks. The brick blocks show human face videos in various facial expressions, and these faces are looking at people passing by. A wall fountain has been installed to add the function of water flows to their mouths. Such wall forms seem closer to artistic works of sculpture than architecture. This building is not, however, irrelevant to architecture in that the placement of a symbolic material of brick-like panels is on the wall surface as part of the building [3].

Figure 2. Crown Fountain spouting water on visitors

The Chanel Tower in the Ginza at the heart of Tokyo presents an LED media façade, creating a unique atmosphere with its distinctive videos. The tower achieves advertising effects by using part of the building as a media canvas. In Figure 3, the Dexia Tower in Brussels, Belgium has 150,000 LEDs in the control panels built inside the windows and creates an array of colors and geometric patterns through their control. Standing tall at 38 stories, the tower has a unique mood separate from its surrounding environment. The control panels are operated by an external console desk, which means that the operator can change them in any way that he wants.

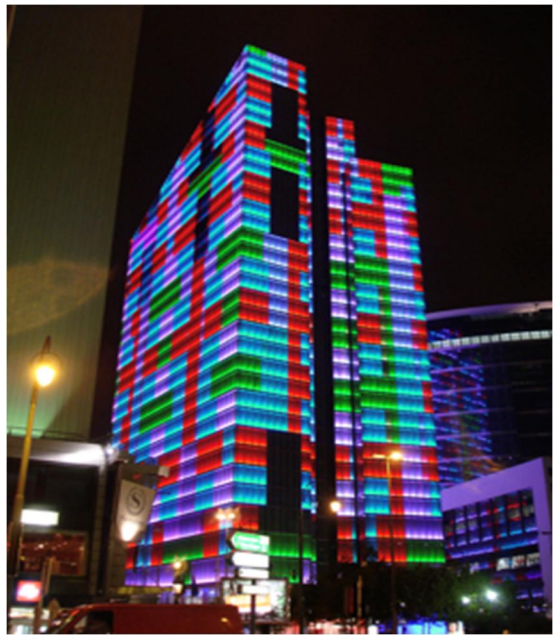

Figure 3. Dexia Tower, Brussels

In Figure 4, the Galleria Department Store ″WEST″ in Ven Ban Berkel has an exterior appearance that is driven by very simple pixels based on LED lighting and the spread of specially design glass discs. There are 43,330 glass discs and LED lights. The two-layer glass discs with a diameter of 83 cm are attached onto the bottom metal structure connected to the main body. As the LED lights are connected to the computer system by the RGB color, the resulting video images are segmented in the big pixel unit. Only Flash-based simple videos are fit for this place. This building demonstrates that the media façade form of the Galleria Department Store has settled down. It takes good advantage of an attribute of media facades, which is to ensure the effective delivery of images even in simple but not specific forms.

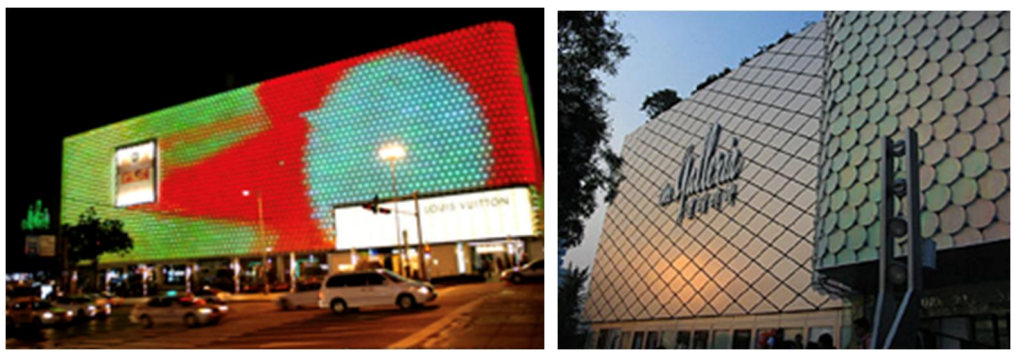

Figure 4. Galleria Department Store by UN Studio, Seoul

Other examples of media façade buildings include O2 Arena in London, the U.K., Allianz Arena in Berlin where the 2006 World Cup Games took place, and Bird′s Nest and Water Cube where the 2008 Beijing Olympic Games were held. All of these types have the propagation power of language found in media based on the combination of LED electronic displays and building exteriors. The media facades mentioned above have a one-sided type [4] of language delivery.

The media façade devised by Aaron Tan, a Singaporean architect, is differentiated from the others for its

interactivity. One of his pieces shines on the large electronic display of 53m x 1m on the outer wall of the SK-T Tower at the entrance of Eulji-ro, Seoul. Created based on a trigonometric function, this work has microphones and location sensors to input the users′ voices and gestures in an interactive system. It consists of projectors to transmit images, large screens, and speakers. Users can talk to characters created by the computer on the screen with a microphone and send the information of their gestures and movements to the system via the location sensors attached to their arms and legs. Once the building opened in 2005, however, the piece functioned a bit different from this original.

In such media facades, spatial boundaries between inside and outside play a huge role. In other words, they consider the correlations between the internal functions and external utilization of a building. When the inside and outside work in the same way, there is an issue with projectivity. There are many cases in which the aesthetic aspect of correlations between the inside and outside of a building is borrowed and used. The elements to determine the materials and structures of building skins are chosen based on their functions as building materials, but they can differ between the inside and outside since they additionally contain design and dynamic elements for communication within the outside world. In Figure 5 and 6, the exterior design of a building can vary according to the media façade technologies of ensuring building durability and changing video content [5].

Figure 5. T-Mobile 2004 by ag4, Bonn, 2004

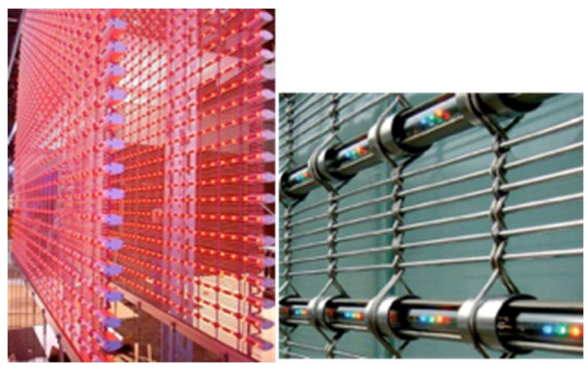

Figure 6. Over 250,000 LEDs are attached to custom-made horizontal aluminum slats

Corporate images, signature logos, and advertising effects on the outside are linked to such design forms. Media facades are made by large corporations and public institutions, but they target a large group of unspecified citizens for interactions, which is why their publicity is further reinforced.

In Figure 7, an interactive installation created by Lozano-Hemmer in 2002, Body Moves proposes a new technology for media facades to promote the active participation of the audience in urban spaces. The Schouwburgplein Square becomes a gigantic cinema building made of the silhouettes and programs of many urban figures. The urban figures made of photographs remain invisible when there is no participation from the audience (which is why large lighting is used). When there are people walking around in the square, they will emerge in the shadow. Once realizing that there are various narrative expressions hidden in them, they start to reproduce various forms of actions and thus take part in them.

Figure 7. Body Movies: Co-presence of two realities (source: Arie Kievit)

3. Utilization of the Projection Technique of a Projector in Media Facades

Language is not fixed. It changes according to the attitudes and environments of users all the time. Once a media façade is created on the skin of a building with LED, it is supposed to hold semi-permanent values and is thus difficult to change its structure and form. It can change the images expressed in it, but its surface itself cannot change. The media façade technology in the projection style of a projector has, on the other hand, variable and fluid attributes and is capable of numerous linguistic expressions. In Figure 8, a projector creates another layer based on its medium itself and generates various illusion effects, which means that the projection technology can express a virtual reality on the original work of a building skin in a realistic manner. Since it is overlaid with light, it proceeds in almost the same way as the form conditions of the building exterior, which is another differentiating feature of the technology from LED panels. As an object is overlaid with projector light, it holds the significance of "extended reality," which was obtained by video artists that grew out of the old monitor frames and adopted the projection technique in the early 1970s. Many artists using the projection media thus use illusion effects as a major concept in their works.

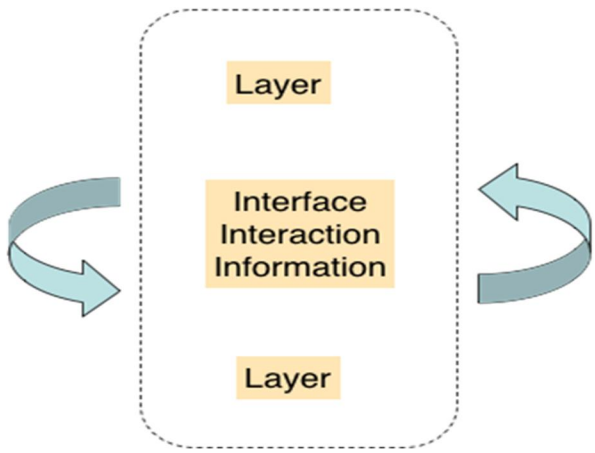

Figure 8. Levels and Meanings of Media Facade Layers

Projection has a Latin origin projectionem(pro+jacere), meaning "throwing forward, expanding, and projecting on a screen," which refer to traveling, transposition, and transmission, respectively [6]. In Figure 9,

media facades made of LED have the source of light heading outward from the inside, but beam projectors have the source of light heading to the surface of a building outside.

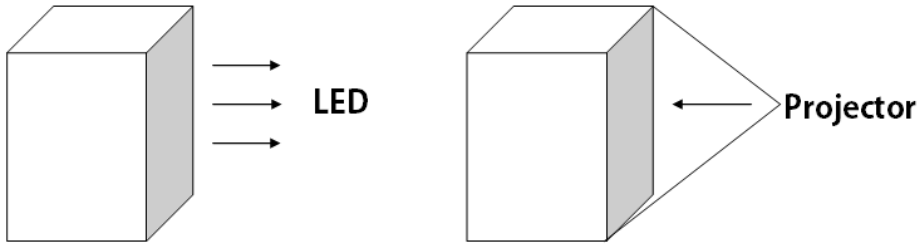

Figure 9. The projection of LED and Projector directional difference

This figure shows the directionality of language delivered by a media façade: it is In → Out in LED screens and Out → In in projectors. There are no big differences to the eyes of the audience since both of them create images on the building surfaces. A project is, however, capable of a mapping structure to wrap the entire outer wall with light thanks to its directionality. It is different from an LED screen in terms of media skins covering up the building skin. In such a case, a building skin works as a cinema screen. The audience feels another reality on the screen that the extended light reaches, and it is similar to the fantasy of a square frame of cinema in the long history of mankind. As the screen opens up outside instead of inside in cinema buildings as expanded obscura, one can easily see differences in the changing audience environment according to the autonomy of the body.

In the cinema environment, the subjects of sight are fixed when watching images. They thus leave their body autonomy to the screen. In the latter case, on the other hand, the environment and the subjects of sight get to have autonomous will based on the independence of their bodies and have their awareness of space and body settle down in them, which leads to an environment where they are willing to move visual images naturally and flexibly. This characteristic presents the biggest reason why a video exhibition at a gallery should be distinguished from a movie at the cinema. While movies show the edited results, videos have a structural difference from them by recording and showing at the same time. In this video system, the audience and the author have the potential effect of performance. As videos record and show simultaneously, this features brings the mirror effects and induces real-time performance, which is called "narcissist characteristic." [7]. As videos have this fluid feature and technological flexibility(capable of direction in various forms unlike cinema), they have various rich possibilities of reproducing and reconsidering objects to be seen, images in still or moving positions, and core central relationship between architectural space and time.

There is a focus on the materiality of light as a characteristic of video projection. Video allows artists to discover that video itself is projected as the same kind of medium or material. Projection offers attractive non-materiality. Images being projected exist and also do not exist since they are not materials but overlaid on things to add another layer of meanings. The light of a projector is a layer on top of the medium of a material, and the outcome of this fantasy seems to have much influence on the boundary of fantasy on the movie screen. In video projection, beams expand on the surface and are overlaid with colorful light. Ephemeral images that will disappear easily lead to freedom in a technological environment and space. Such expansion and autonomy creates a chance to move out into an external environment. In Figure 10, projection videos can bring about

social participant or active body actions beyond physical passivity at the formal cinema theater, and this is the biggest feature that makes projection videos function as media facades at public places.

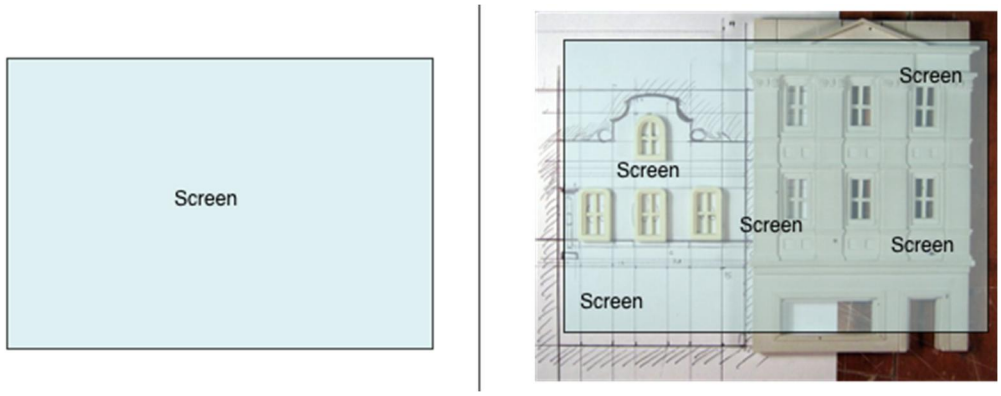

Figure 10. Comparison of Openness between Film Screen and Media Facade Screen

In her <A Voyage on the North Sea>, Rosalind Krauss points out that the fundamental ″synthetic and total nature″ of film is the reason for the environment where physical supports can never be reduced over the progress of modern culture since modern art has the ″post-medium condition.″ Furthermore, she connects the autonomy that video artists have objected unlike in the cinema to architecture and finds the natural root in the term ″information architecture.″ Buildings that used to have only classic functions get to have a new function of delivering information, and it is connected to the changing designs and materials of building skins. Proposing the possibility of creating the information, video projection can be regarded as an element of experimental architecture capable of mutual penetration. When it is discussed in connection to the concept of media façade that modern buildings focus on, it is an extension of the expression, ″Forms follow functions.″ It can develop in connections between the communication, interaction, and entertainment elements of modern buildings′ functions and the meanings of video projection.

Projection mapping makes a building skin a screen, which means that it needs a technology of resolving distortion issues due to inconsistent surface angles. The method of keystone effect readjusts image distortions due to different angles of light reaching the surface according to the viewpoint of a person that sees them. It is a built-in function of a projector, and software suites developed these days have functions of adjusting such angle differences in real time. In Figure 11, the formula shows how to adjust sides through angle regulation for distortions of projector images reaching the screen.

$$\frac{\cos(\varepsilon - (\alpha/2))}{\cos(\varepsilon + (\alpha/2))}$$

Figure 11. Keystone's formula [8]

In Figure 12, there are a couple of video mapping programs capable of real-time work including Maxmsp and Jitter-based VTP [9] and VVV programs. All these programs provide an easy user-centric function of adjusting keystone effects. VVV can adjust side angles easily in real time in the opengl environment. VVV can separate screens to project 16 independent layers at different angles at the same time with a single program.

One of the leading video projection-based performance groups is AntiVJ that has attracted attention with illusion and experimental videos. Some corporate advertising campaigns succeeded in generating effects by using this fantasy effect, and they include Samsung′s recent 3D projection mapping projected onto an outer wall of an Amsterdam building and BMW′s 3D projection mapping on a wall in Singapore.

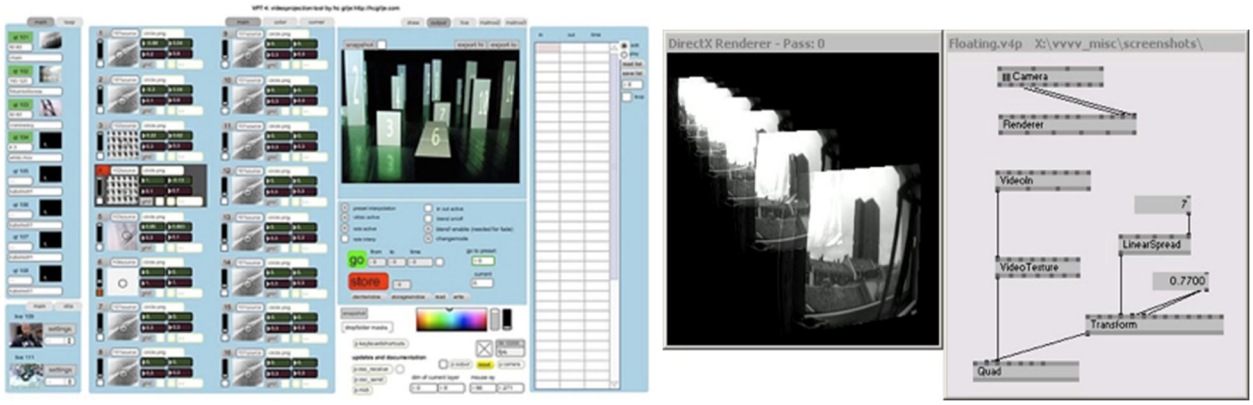

Figure 12. Video projection tools - VPT (left) / VVVV tool (right)

4. Conclusion

World-renowned big cities like New York, Tokyo, and London have led the major flows and changes of modern urban landscapes based on technologies combined with skills. Huge LCD screens and LED billboards take up most space in urban architectural landscapes. Architecture is becoming a huge interface in urban space and becomes a medium itself for communication as a visual interface.

A screen is part of attractive urban panoramas capturing the eyes of people. It is becoming a vivid part of visual perception as people understand their surrounding space, thus producing visual literacy for many images. The forms created by the reproduction technologies derived from static two-dimensional architecture have become increasingly dynamic and open and capable of expressing three-dimensional space. In this context, media and messages play even more important roles as they have public nature as well as individual participation. These days, more and more performance works use fluid and variable video projection in addition to LED-based media canvas. They create a new layer of space through optical illusion and thus present a fantasy.

Such works may face a dilemma between messages and content required at public places where many people gather and alchemistic splendor. Buildings serve increasingly media roles to deliver a message and share information, which is definite proof that building and media make each transparent. Technologies have made it possible to break down a wall and have a peek at others close, which means that people are exposed as much as others. It is expected that individual user-based mobile devices will develop in close connections with media facades, which makes information sharing as important as information delivery. Here, individuals should be important primary subjects of production. Groups, corporations, and public agencies have led media façade works instead of individuals due to their size and economic issues. Advertising led by corporations, of course, holds its own artistic value and significance, but there are other roles of media façade not preserved only for corporations and public agencies. If there are venues for individuals to share such interfaces and create and present content and also chances for them to make a presentation to others, the content of media facades will

have continuity and interactive mobility.

There is, however, a shortage of academic research on media facades home and abroad compared with their explosive media demands and outcomes. This requires supports from academic theories. It also needs a systematic social network system capable of new urban communication in virtual spaces where people get messages and information as well as physical environments and public places.

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