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Phenomenological Transparency through *Depth* of "*Inside/Outside*" for a Sustainable Architectural Environment

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Abstract: The potential relationship between external and internal spaces in the architectural environment of the post-pandemic era is emerging as an essential issue. Since the early 20th century, the issue of transparency inside and outside architecture has been explored in various fields. This study is motivated by the lack of a leading theory about architectural transparency in the post-pandemic era. First, it revisits the notion of phenomenal transparency in Colin Rowe and Robert Slutzky's influential text on "literal" and "phenomenal" transparency. Next, it investigates Maurice Merleau-Ponty's phenomenology for architectural transparency. Last, it scrutinizes practical possibilities using cases from Sejima and Nishizawa and Associates (SAANA). It finds that intertwining the cognition of natural environment and spatial experiential perceptions can create phenomenological architectural experiences. Sustainable architectural transparency may be accomplished when three factors (the visual perception of space, spatial experiential perceptions, and the cognition of natural environment) are incorporated. Further, *depth* functions as a medium for architectural transparency, intertwining between material and immaterial, literal and phenomenal, and visible and invisible. There is tremendous potential to conduct pilot studies based on this study, to re-evaluate architectural transparency with phenomenological ideas.

Keywords: Maurice Merleau-Ponty; SANAA; depth; phenomenology; sustainable model for architectural transparency

Citation: Kang, E.; Park, E.J. Phenomenological Transparency through *Depth* of "*Inside/Outside*" for a Sustainable Architectural Environment. *Sustainability* **2021**, *13*, 9046. https://doi.org/10.3390/su13169046

Academic Editors: Carmela Cucuzzella, Jean-Pierre Chupin and Cynthia Hammond

Received: 12 July 2021
Accepted: 4 August 2021
Published: 12 August 2021

1. Introduction

The potential relationship between internal and external spaces for a sustainable architectural environment in the post-coronavirus disease (COVID-19) pandemic era is emerging as an essential issue and has attracted researchers' attention. Deborah Berke, Dean of the Yale School of Architecture, in expressing her views on the subject of how architecture should adapt to a post-COVID world, stated: "Spending more time at home with family, working and learning remotely, being more mindful of the relationship between indoors and outdoors . . . . How the home (architecture) is connected to the outdoors—to views, light, and air [1]".

The architectural solution related to this quotation is closer to a philosophical method of existence and a qualitative perspective—allowing us to examine the hidden inner quality and the essence of life—rather than to the quantitative analysis method of positivism [2,3].

As people spend more time indoors, a specific theoretical frame is required to identify the factors needed to accomplish architectural transparency for bringing the outside experience into the inside. Therefore, this study starts by exploring the experience of space in phenomenology. Phenomenology is the study of "phenomena", that is, things as they appear in our lived experience or the way we experience things [4–6]. In this regard, Maurice Merleau-Ponty's phenomenological perspective reveals this essence (phenomena through our experience) by establishing a constant relationship with the external environment. Although many theorists, such as Hannah Arendt and Husserl, seek to develop an

in-depth theory to embody an understanding of human existence, Merleau-Ponty emphasized the significant aspects of "intrinsic ambiguity, indeterminacy and transparency that the phenomenological 'perceived world' contains [7]". Therefore, in the present situation, it is necessary to reconsider the architectural environment from the phenomenological viewpoint of Merleau-Ponty.

Architectural transparency, which deals with the relationship between internal and external spaces, has been analyzed through a strangely binary perspective, such as "space/form", since the early 20th century. The view of spatial synchronicity as architectural transparency through Cubist spatial analysis came to fruition with Colin Rowe's "literal/phenomenal transparency" in the 1960s. After the 1990s, a perspective emerged that showed the tendency of aesthetic sensuousness on the surface/space, which results in architectural transparency through separating the interior from the exterior. Thus, the architectural and theoretical background of transparency has mainly dealt with visual perception. However, in Merleau-Ponty's spatial theory, the body experience and the cognition of the environment are more important than visual perception. Similarly, from a phenomenological perspective, space is divided into geometric and experiential spaces [8–11].

Therefore, to bridge this gap in the literature between the various theories on transparency and to develop a new paradigm for the post-pandemic era, we use the following research methodology. We analyze the perspectives about transparency in architectural discourses, especially Colin Rowe's "phenomenal transparency". Simultaneously, we consider the method of viewing the environment using Merleau-Ponty's phenomenological idea, thus comparing the views on transparency in architectural discourses. Our research question is as follows: How do we define the new phenomenological transparency after the pandemic and find the answer to this critical issue of our times?

To answer this question, we examine the flow of architectural transparency theories in Section 2.1 and the literal/phenomenal transparency of Rowe and Slutzky in Section 2.2. (see Figure 1). In Section 2.3, we examine the depth of Cubist art, which is the basic concept of space and transparency in Merleau-Ponty's phenomenology. In Section 2.4, we focus on architectural transparency and investigate this concept along with Merleau-Ponty's discourse on "depth". In Section 3, we present a case study that explores the theory of transparency through the architecture of Sejima and Nishizawa and Associates (SANAA) since the 1990s. SANAA's discussion of its architecture is based on an inside/outside relationship, and it has developed architectural transparency in several ways [12]. Through the analysis framework, the architectures of SANAA are analyzed.

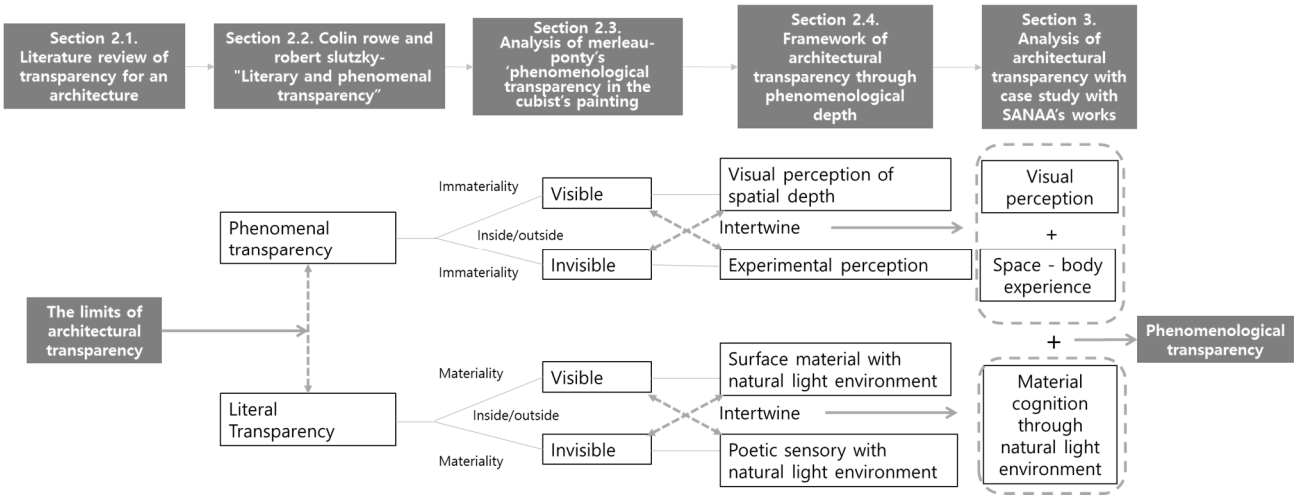


Figure 1. The research process (source: authors).

With this methodology, this study explores both human perception and environmental cognition concerning the internal/external environment. This study is significant because

of the lack of a leading theory about architectural transparency in the post-pandemic era. This lack of a theory motivates this study to explore the notion that transparency is the relationship between a sustainable architectural environment and human factors, using Merleau-Ponty's phenomenology. There is tremendous potential to conduct pilot studies to re-evaluate the spatial milieu of architectural transparency, based on this study.

2. Literature Review and Methodology

2.1. Literature Review of Transparency for Architecture

The issue of transparency in architecture has been covered in various topics since the early 20th century. For instance, Rowe and Slutzky analyzed the spatiality of modern architecture, such as Le Corbusier's works, through "literal/phenomenal transparency". The importance of Rowe and Slutzky's achievements in architecture has been demonstrated by their influence for nearly 60 years.

The shift to surface-related issues in architectural transparency was announced through an exhibition at the Museum of Modern Art (MoMA) in 1995. The "Light Construction" exhibition, curated by Terrence Riley, examined the new trend of post-modern architecture from the perspective of transparency [13]. This architectural exhibition organized by MoMA offers a significant opportunity to understand the changes in modern architecture [13]. Since the 2000s, more studies have examined superficial transparency, focusing on "envelope" or "surface" transparency, rather than on spatial issues. Therefore, the visual perception of physical properties has become a significant issue.

Similarly, since the 2000s, there have been various discussions about architectural transparency as "surface/envelope/politics transparency". In 2008, Colomina [14] argued that the discovery of X-rays had a profound impact on architecture. She also mentioned that its discovery had been reconfigured to perceive, in particular, the relationship between the inside and the outside of the space. Her theory perceives X-rays as images of a building exterior with transparent glass revealing the interior structure of a modern building with curtain walls. Further, the idea of architectural transparency exposed to the public is about data-related politics [14–16], and even of a world entirely shaped by big data with surveillance [14,17,18].

Eve Blau highlighted the discussions about transparency in the 2000s that focused solely on the surface, noting that transparency creates a dialectical tension between social information and experience [19]. Moreover, she stated that transparency is not a concept of architecture that considers contradictions nor is it about the capabilities of visualization techniques and the surface effects of buildings [20]. She asserted that transparency could provide a particular conceptual framework for experiential design practice with invisible social information (i.e., a type of program) [20].

Later, the discussion of architectural transparency expanded to include "poetic transparency" [21]. The architectural biennale selects a theme that leads the era (see Table 1). Through the participation of many architects and artists in this biennale, new experiments have been conducted by using architecture and society or architecture and art. Criticism of the visual perception of transparency as a surface led to the declaration of a change in the spatiality and psychological factors of buildings at the 12th International Architecture Festival in 2010. For instance, film director Wim Wenders brought about transparency as a three-dimensional space in a new way at the biennale [22].

Therefore, at this point when it is essential to redefine the relationship between the inside and the outside, the discussion of architectural transparency beyond the visual perception of surfaces must be examined. Moreover, it is an important time to reconsider a new architectural methodology apart from the most influential "literal/phenomenal transparency" through the phenomenological idea. This study revisits Colin Rowe and Robert Slutzky's "literal/phenomenal transparency" and investigates its limit [23]. Then, it examines the concept of depth in Merleau-Ponty's phenomenology, which goes beyond visual perception and reproduces a new spatial cognition.

Table 1. Studies on architectural transparency (1920s–2010s).

Time	Classification by Keywords	Subject	Main Author/ Exhibition
Early 20th century	Space/Formation	A. Theories of "space creation"	Hildebrandt, Schmarzow and Sitte, to van Doesburg, Moholy-Nagy, and others
		B. Theories of "image formation"	Richter, Kepes, Gestalt psychology, etc.
1920s	Space/Time relational space	Discourses regarding "relational space" or "space-time"	Giedion, Le Corbusier, and Mies
1950s and 1960s	Literal/Phenomenal transparency	"Transparency: Literal and phenomenal"	Rowe and Slutzky (1963)
1970s	Space-Phenomenal transparency	"Literal/Phenomenal transparency" and its impact	Eisenman, and New York Five
1990s	Light construction/ Transparency and Modernity	"Light construction" "Transparencies yet to come: Sigfried Giedion and the prehistory of architectural modernity"	MoMA (1995) Detlef Mertins (1996)
From 2000	Surface (Envelope)	"Surface architecture"	David Leatherbarow and Moshen Mostafavi (2005)
	Politics (Media)	"X-Ray architecture"	Colomina, B. (2008)
	Social program (Information)	"Tensions in transparency"; "Transparency and the irreconcilable contradictions of modernity"	Eve Blau (2009)
	Poetic transparency	"The eye of the skin: Architecture and the senses" "Practical poetics: Rhythmic spatiality and the communicative movement between site, architecture, and sculpture"	Steven Holl, Juhani Pallasmaa (2005, 2006) 12th International Architectural Festival of the 2010 Biennale (Wim Wenders, 2010)

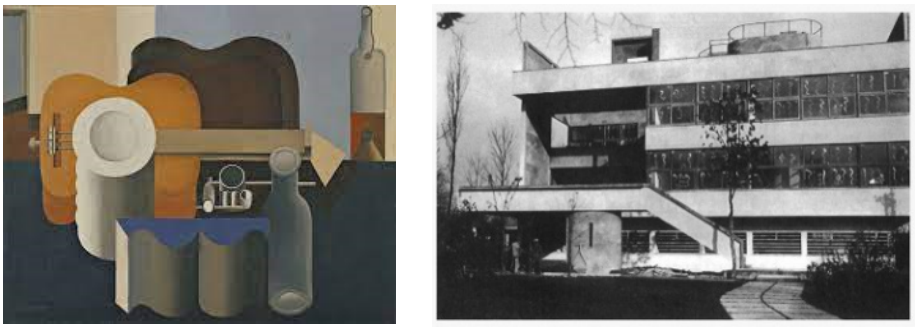
2.2. Transparency: Literal and Phenomenal

Rowe and Slutzky proposed two types of transparency in architecture in the essay, "Transparency: Literal and Phenomenal". They divided transparency into literal, meaning the material conditions of glass, and phenomenal, as derived from Cubist paintings. "literal transparency" describes the material quality of being see-through, and phenomenal transparency describes the perceptual attributes that allow the mind to discern the underlying governing concepts or spatial concepts [23] (p. 45). Through their idea of "phenomenal transparency", they primarily investigated the relationship of visual perceptions using the human eye with superimposed two-dimensional visions of architectural space and the world.

The problem is that this explanation and Rowe and Slutzky's analyses started from "binary distinction" [24] (p. 3) as "literal/phenomenal" and only touched the surface of phenomenological criteria [25]. Detlef Mertins also argued that Rowe and Slutzky's analyses are limited and quoted Rosemary Haag Bletter, who said that their research is "too erratic to make workable categories" and that they are "unorthodox", considering their interpretation of Cubism. Rowe and Slutzky's transparency is based on phenomenology, but their study merely occupies the limit that spatial perception is just "on axis with the plane of the façade". That is, in their study:

> *Their concept of transparency was likewise based on Phenomenology of spatial perception, albeit a four-dimensional one in which the boundary between inside and outside, subject and object were dissolved for an observer in a position on axis with the plane of the façade as if viewing a painting* [24] (p. 3).

Rowe and Slutzky's study, "Transparency: Literal and Phenomenal", has two major problems in relation to this spatial perception of phenomenal transparency. The first is that through misunderstanding Cubism, they not only eventually fail to develop a new form of perception but also remain in the artificial depths of space in terms of expression. Their idea of phenomenal transparency seems to be aimed at "a further level of interpretation" to be discovered in Cubism artwork. However, they overlooked some aspects of Cubism. From a phenomenological perspective, Cubism was an attempt to develop new forms of perception to overcome the limits of "the perspective of the Renaissance" [23] (p. 45). Cubism rejects the traditional techniques of perspective. The artificial depth of the Renaissance perspective was the main issue the Cubist painters wished to overcome. However, their representational ways for understanding Le Corbusier's Cubism work, "Still life", were still defined by an artificial depth of space through an axis with the plane of the façade (Figure 2a).



(**a**) (**b**)

Figure 2. (**a**) Le Corbusier's work, "Still life" (source: creative commons license); (**b**) Villa Garches [23].

The second problem lies in the hasty assumption that their understanding of "phenomenal" is simply the opposite of "literal". This is because it has already been assumed that "phenomenal" is a two-dimensional interpretation of three dimensions, and "literal" means simple three-dimensional, physical properties required for things to exist. In the 1890s, Fernand Leger introduced the idea of two-dimensional transformations of three-dimensional objects. In his paintings, two-dimensional changes aim at obtaining artistic precision by

disintegrating the volumetric conditions of natural things into planes and merging the planes, thus gaining a new perspective [23] (p. 48). However, applying Leger's Cubism to Rowe and Slutzky's phenomenal transparency has some problems that require clarification. Rowe and Slutzky's representations of architectural space are mere superimpositions of several frontal viewpoints that are opaque, two-dimensional views of the whole scene [23] (p. 46). Colin Rowe's drawing of Villa Garches can be considered a similar representation (Figure 2b). Through this diagram, they insist that there is a dialectical relationship between fact (3D) and implication (2D) and urge us to read space with "resultant tension" [23] (p. 53). However, "resultant tension" cannot be reached through a certain geometric depth.

In the same context as the above criticism, Rowe and Slutzky's diagram of the League of Nations project (see Figure 3) shows the depth of space perception. The diagram is assembled through morphological meaning using geometric thinking. It appears in the depth interval equivalent to a flat field. They claim that *depth* carries the linguistic meaning of "fluctuates in a continuous activity" [23] (p. 45). This mistake is due to misunderstanding the meaning of phenomenal in the context of "depth"; that is, the visible walls and openings cannot be defined solely in their spatial experiences.

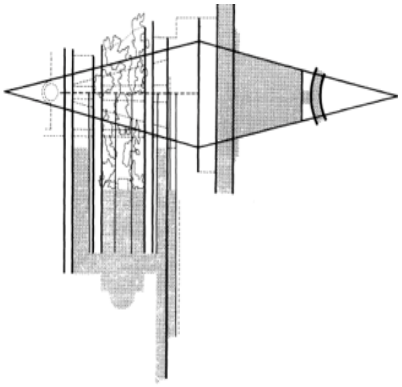


Figure 3. Diagram of the League of Nations project [23].

2.3. Analysis of Merleau-Ponty's Depth and Phenomenological Transparency in the Cubist Painting

Architectural transparency is ultimately a way of viewing the phenomenological depth between the external and internal environments. Merleau-Ponty indicated that through depth as an intimate moment of perception, space can be opened up before our eyes so that the sense of a materially present thing is proposed (proposer) for the first time. This section examines Merleau-Ponty's interventions in spatial perception in phenomenology. This intervention is completed not only by visual perception but also by intertwining body experience and the cognition of nature. Through the intervention, *depth* becomes a medium to show the presence of the world to people, as explained in the following quotation:

> *When through the water's thickness I see the tiled bottom of the pool, I do not see it despite the water and the reflections; I see it through them and because of them. If there were no distortions, no ripples of sunlight, if it were without that flesh that I saw the geometry of the tiles, then I would cease to see it as it is and where it is* [26] (p. 142).

In this example, Merleau-Ponty's "water depth" of a swimming pool with its reflections, distortions, and ripples of sunlight elucidates existence. This quotation shows the role of depth as a medium. Therefore, depth is the interplay between body and mind at a distance.

As for experiential perception, Merleau-Ponty said, "space is how the environment in which things are arranged allows them to take place" [2]. This means it is not a simple space or a space in which objects are arranged. Still, a new field is created when a human being who is intimate with an object forms a "relationship". Merleau-Ponty asserted that abstracted eyes do not produce the visual experience alone, but rather, it is created through the intervention of the whole body. To explain this idea further, Merleau-Ponty's

phenomenology of space is as follows: Space precedes the space experienced before the geometric space; everyday space is not a neutral space, but a space where meaning is always born, and this meaning emerges from perceptual activities based on the body, and not on the sight alone. Merleau-Ponty's theory of space refutes that geometric space is the substance of space. This is because Merleau-Ponty understood space not as an arrangement of geometric space but as establishing a place through the holistic relationship between various objects and bodies: "More directly than other dimensions of space, depth forces us to reject the preconceived notion of the world and rediscover the primordial experience from which it springs" [2] (p. 256).

Interpreting this quotation, "to have at a distance" is a kind of depth for making the invisible visible. In addition, Cubist paintings do not evoke the tactile; instead, to cite Merleau-Ponty's words, they make the tactile visible. Depth makes the tactile visible in the experiential perception.

Merleau-Ponty repeatedly used words such as "ambiguity" [27,28] or "obscurity", and "depth". Merleau-Ponty mentioned that all experience is ambiguous. These words represent a situation in which reversibility (material/immaterial, visible/invisible, and internal/external) is intertwined in space. Merleau-Ponty's understanding derives from this chiasm, especially from the relationship between visible and invisible. Rowe and Slutzky also stand at the same point with the phenomenal/literal transparency he tried to solve concerning architectural visible/invisible. Further, they investigated Cézanne's "Mont Sainte-Victoire" (Figure 4) [2,23].

Unlike Rowe and Slutzky, Merleau-Ponty actively introduced Cubists' depth as a medium for perceiving a space or nature. Merleau-Ponty began his article "Eye and Mind" with a critique of the constructivism of modern science and then considered the experiences of the "brute or existing world", which scientific endeavors cannot measure. Merleau-Ponty borrowed Cézanne's concept of "the simultaneous expression of light" for his phenomenology of perception concerning the cognition of nature.

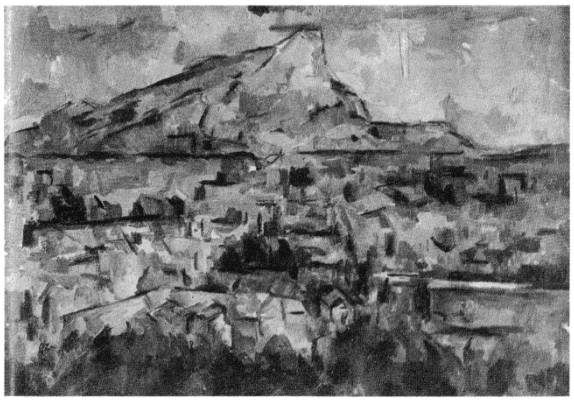


Figure 4. Cézanne's "Mont Sainte-Victoire" [23].

Merleau-Ponty indicated that only through depth as an inseparable moment of perception can the three dimensions of space unfold before our eyes so that we gain the sense of a materially present thing for the first time. Moreover, the dimension of the depth in space has great phenomenological significance. The depth as a medium for experiential perception and cognition of nature exists more directly than the other dimensions of space through visual perception.

2.4. A Medium for Architectural Transparency through Phenomenological Depth

Juhani Pallasmaa and Steven Holl are representative architects who try to counter the concepts of modernist architecture based on Merleau-Ponty's spatial theory [20,29,30]. For them, architecture does not just mean visual form or abstract spatial composition. Steven Holl's architecture and his words concerning transparency are similar to Merleau-Ponty's

understating through depth. Through the depth of Merleau-Ponty, we could consider potential ambiguity [23] (p. 45), which does not arise from the "physical surfaces" implicated in the visual perception. Instead, it could be called "poetic" [31] and "experiential" depth. Steven Holl said that "the poetic" in writing is "opaque", "ambiguity", and the opaque in architecture creates conditions of poetry [32–34]. This "poetic" and "experiential" depth is closely related to terms such as visible/invisible and materiality/immateriality.

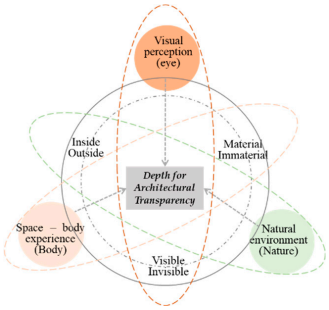
The other example of showing depth in the experiential perception and cognition of natural light is Louis I. Kahn's argument for the spatial quality of a court. Louis I. Kahn stated:

> *I present another way of looking at, say as a court, and you enter this court . . . In the halls that you go through, you will absorb by some osmosis . . . you will see things . . . There is something that has to do with "the feeling of association" which is remote, rather than direct, and "the remote association" has a longer life and love* [35] (p. 57).

Spatiality derives from a "feeling of association", which Kahn regards as "remote". The state of being remote makes the feeling of association more concrete. A place such as a court that can evoke the sense of a place makes the inside/outside. The state of being remote is like being "at a distance". This spatiality allows people to see all aspects of being. Thus, we can understand Merleau-Ponty's words that depth at a distance is the most existential of all dimensions [36] (p. 16).

Space has both physical and psychological depth through interactions between these phenomenological languages (visible/invisible, material/immaterial, and inside/outside). Significant architectural immanence is not achieved by visual perception alone, but by the implicit interaction of three elements: visual perception, the body's experience, and cognition through its natural environment (see Table 2). Just as a Cubist painter expresses the world through depth as a medium, the immanence of qualitative experience between the outside and inside allows us to experience the real world's depth [26] (p. 140) through the environment as a medium.

Table 2. Analysis framework; medium for achieving transparency quality; and languages of phenomenology (source: authors).

Action Factor for Architectural Transparency	Analysis Factors	Action Diagram
Medium through "depth"	• visual perception (eye) • space-body experience (body) • cognition through natural environment (nature)	
Languages of phenomenology	• visible/invisible • material/immaterial • inside/outside	

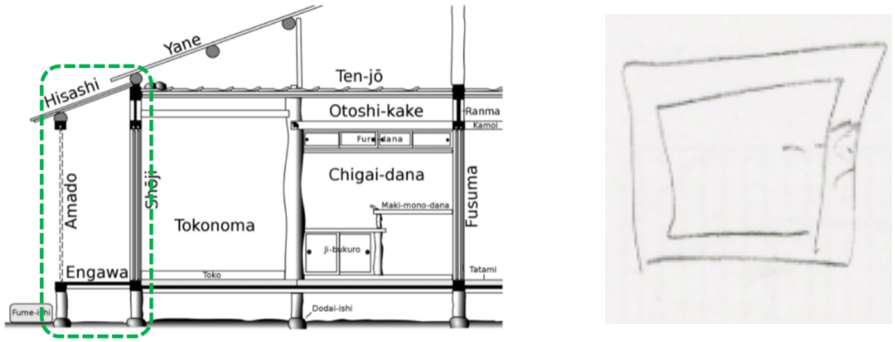
3. Analysis of Architectural Transparency with Case Study of SANAA's Works

3.1. Diverse Roles through Depth of Inside/Outside in SANAA's Architectures

SANAA has discussed its architecture with an inside/outside relationship and has developed architectural transparency in several ways [12]. SANAA has stated that they are always interested in identifying ways to build external and internal relationships. Regarding the relationship between the inside and outside, SANAA mentioned a type of buffer that mediates between the spaces in which the circulation space operates, which could be very similar to the traditional Engawa [12,37]. Engawa (see Figure 5a) in the historical Japanese architecture and the space between space in the garden at the center of the cloister serve as a buffer zone outside and inside the building. SANAA also mentioned that a similar space could be found in Europe. A convent with a gardener in the center of a cloister [12] (see Figure 5b). Eva Blau quoted SANAA's argument with Toledo Museum (2006): "One of the things we wanted to achieve with the project was to create an intimate

relationship between the inside and the outside, giving visitors the feeling of walking under the trees . . . feeling the green atmosphere of the garden" [20] (pp. 59–58).

In this section, we investigate transparency as a buffer for the depth action of each case's inner and outer boundaries. The reason for selecting the three cases—Contemporary Art Museum in Kanazawa (1999–2000), Rolex Learning Center (2005), and Grace Farm (2015)—is that there is a time difference between these of more than five years at building completion. The way SANAA's buildings occupy architectural transparency through different mediums tends to be considered a result of time differences. Moreover, we selected public buildings as targets of this case study from among buildings that deal with transparency in different ways.



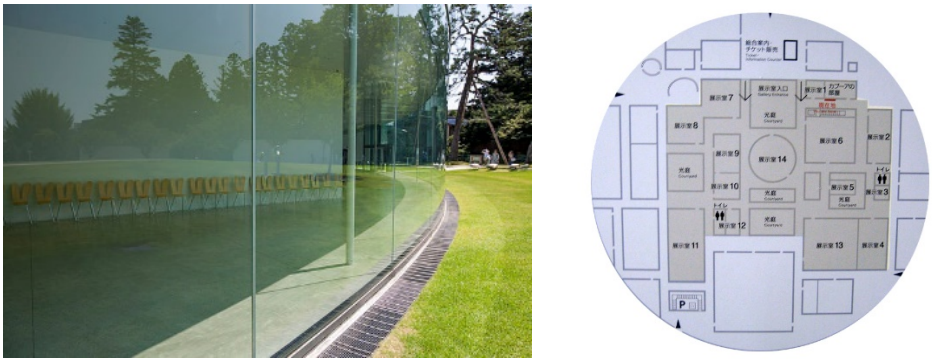
(**a**) (**b**)

Figure 5. (**a**) Engawa cross-section (green line) through part of an Edo-era Japanese house (source: Wikimedia Commons); (**b**) SANAA's conceptual drawing of a cloister (source: Copyright Adapted with permission, 2005, El Croquis, p. 9).

3.2. Case Study

3.2.1. The Contemporary Art Museum in Kanazawa (1999–2000): Visual Perception as a Primary Medium for "Depth"

The architecture of the Contemporary Art Museum in Kanazawa has a clear boundary between inside and outside in glass (see Figure 6a). The boundary with the outside is composed of a transparent glass wall that integrates and surrounds the combined rooms. The space surrounding the central exhibition space, which is viewed as a public space, acts as a buffer zone (see Figure 6b). In this work, the corridor that creates the secondary boundary serves to create visual perception of the relationship between the opaque rooms.



(**a**) (**b**)

Figure 6. (**a**) Visual Perception, Contemporary Art Museum in Kanazawa (source: Wikimedia Commons); (**b**) A buffer zone for public space (source: authors).

The exterior glass walls are reflective and transparent, depending on the weather or the position of the sun. When the sun's reflection is low, you can see deep into the center of the building, and at other times, the glass reflects a refracted image of the surrounding environment.

Owing to the multiple layers of glass, the inside walls also reflect and refract the space surrounding them and visually project those spaces into each other. Architecture as a visible space, especially the facade, visually fascinates people [38]. This effect creates visual complexity and spatial layering. This design demonstrates the potential to create various spaces where each space is opened and closed, connected and separated from each other with visual transparency. Transparency allows architecture users to orient themselves while increasing their awareness of their relationships with surrounding objects and spaces [19].

SANAA's task was to create a balance between the public and private realms, blurring the lines between both through visual perception. The museum's program is central to the museum and close to the outer perimeter, which is a public buffer zone that includes meeting spaces, reading rooms, libraries, children's workshops, restaurants, and service spaces. The museum is an aggregation of spaces with varying areas, opacities, and heights, ranging from 4 to 12 m, inserted in a circular glass skin to connect with the external environment.

The works exhibited in this museum also establish active visual relationships and passive observations through the various connections of visual perception between the viewer and the exhibited object. For example, Tadao Ando's Chichu Art Museum in Naoshima has works similar to the outdoor sculpture "Sky Blue Planet" by James Turrell. The spectators who make up the sky witness the ever-changing spectacle of the sky and environment [39]. Another work, Leandro Erlich's "Swimming Pool", shows the depth of phenomenological transparency. Two acrylic plates were placed about 12 inches apart in the basement, and a layer of water about 4 inches thick was also placed on top of the acrylic for a realistic effect. Thus, there appears to be a swimming pool in the middle of the museum, and it is impressive to see people in the water (in the underground exhibition hall) from outside the pool. When one enters the underground exhibition hall, one can see people above through the water [40]. The spatial depth of the exhibition hall is newly recognized through the medium of virtual water depth (Figure 7).

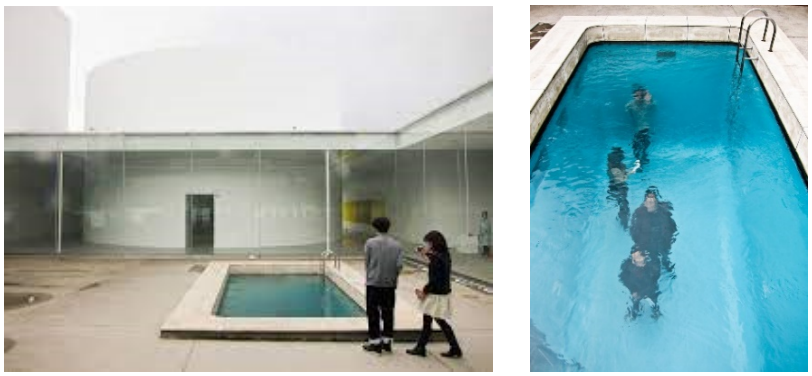


Figure 7. Leandro Erlich's "Swimming Pool" at the 21st Century Museum of Contemporary Art in Kanazawa by SANAA, Japan (source: creative commons license).

3.2.2. Rolex Learning Center (2005): Space-Body Experience as a Primary Medium for "Depth"

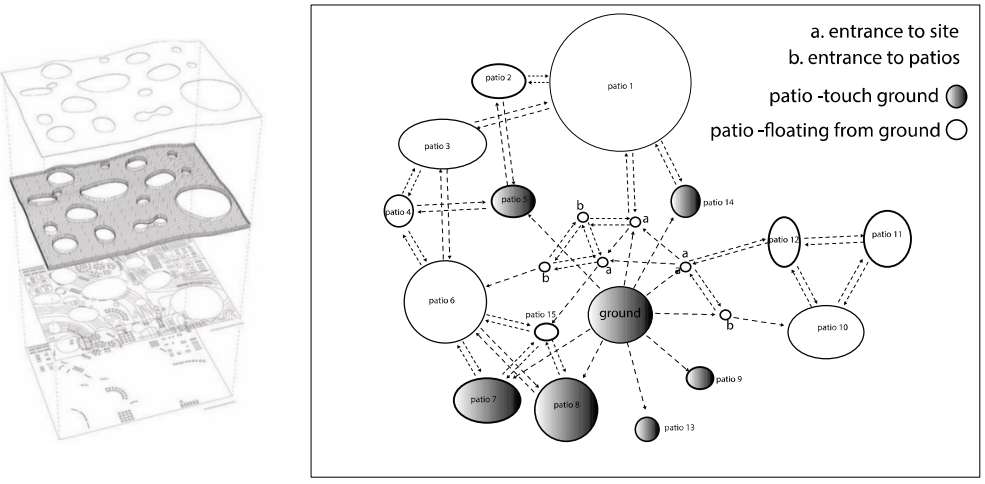
The Rolex Learning Center is a work in which the architectural program is actively reflected through bodily experiences. Eve Blau says that SANAA advocates functional and visual transparency to create a dialectical tension between information and experience. The information can be interpreted as a program of architecture [19]. Eve Blau quoted SANAA's argument concerning transparency and programs: "What I mean by transparency is somewhat different from 'being able to see.' In my opinion, the information society has more to do with Not seeing" [41,42]. An interview with SANAA in 2001 revealed that the program and its way of experience are intended as an experiment on transparency to

go beyond visual perception. The Rolex Learning Center showcased this new attempt at transparency through intertwining the experiential depth and the cognition of nature.

The Rolex Learning Center is located in the Ecole Polytechnique Fédérale de Lausanne (EPFL)campus. The EPFL held an international competition to select architects for building this Center. The EPFL has formulated very ambitious program requirements to guide the future of learning. The architectural program aspect demands far more than functional requirements. Buildings need to "endow themselves into the environment as a sign of the landscape", are "magnified", "should be important", and "should be a beehive of activity" [41]. As an architectural device for this activity, the flowing landscape, the building provides a view unobstructed by walls, with a disturbing visual perception of the interior and courtyard. The greatest strength of the building lies in the continuous floor plan. The experience of bending through space differs from that in other spaces. It is an experience that challenges traditional movement concepts with artificial structures, such as strictly vertical or horizontal ones [43,44] (see Figure 8).

Figure 8. Space-body experience in the Rolex Learning Center (source: creative commons license).

Figure 9a shows a plane representing the site level and the ground floor. This drawing reveals the depth of space between the ground level and the patio. The diagram in Figure 9b shows the link between space and visual connections. Through the complexity between the material (glass) and the immaterial (sense of patio's depth), people can perceive the experiential depth in space.



(**a**) (**b**)

Figure 9. (**a**) Diagram of Rolex Learning Center (source: creative commons license); (**b**) Diagram of Rolex Learning Center: Interaction between the patios (source: authors).

In SANAA's architecture, we find many elements that we can only experience and cannot otherwise grasp. They aspire to create an atmosphere or landscape but focus on the spatial experience [41]. SANAA's approach for dealing with architectural experience is to cherish the changes in the surrounding environment and link the continuity of sense of place into spaces.

It demonstrates the idea of interaction between the patio's spatiality and the materiality of glass. In describing the building that SANAA designed for the Rolex Learning Center, Wim Wenders visualized the "sense of place" in his film. He noticed SANAA's architectural attempts through the reflective and translucent capabilities of glass to exploit its dimensions for spatial complexity and depth of field. In the film *If Buildings Could Talk,* Wenders said:

> "If Buildings Could Talk . . . *Buildings, like people, are subject to time and exist in a three-dimensional world . . . It's an invitation to wander around, to experience and to listen, for once. The building you will encounter is a particularly gentle and friendly one, made for learning, reading and communicating. Its hills and valleys (yes, they exist in there) are eager to welcome you, to help, to be of service, and to be, in the best sense of the word, a meeting place* [22,45]".

Perhaps this lyrical narrative of the building is his attempt to express the spirit of buildings. It is similar to how many painters have described moments where things seem to look at them. From the film techniques and interviews with Wim Wenders, we can read the director's intentions for presenting his "sense of place", which intertwines the visible and the invisible, and the material and the immaterial.

3.2.3. Grace Farm (2015): Natural Environment Cognition as a Primary Medium for "Depth"

SANAA argued that "circulation and natural light were essential features of 20th-century museums. Museums in the 19th century [as a typology] did not need natural lighting, but now they need natural lighting. They depend on it" [46]. After serious consideration of bringing the cognition of the natural environment into the architecture for the New National Gallery's competition, it was further refined at Grace Farm.

Grace Farms is a community center located in Connecticut, United States, designed to focus on nature, the arts, and the community. The slenderness of the architectural, structural elements of this building is very important. The main building has very thin columns, and the roof feels like a "loaf of gum" added to thin out certain canopy areas. A river nestled in the meandering landscape of Grace Farms flows into the courtyard. It starts forming a pond-like space that flows along a series of bends down a long, gentle slope (a change of slope of 43 feet 9 inches). Structurally, a building made of glass, concrete, steel, and wood is essentially a single long roof that appears to float above its surface as it twists and turns across the landscape. The walkways, courtyards, and glazed volumes formed under the roof are highly transparent and invite people to participate in the vast natural environment [47].

SANAA's client, the nonprofit Grace Farms Foundation, requested for this architecture to provide an experience of nature: "a place of cultural interest and curiosity through open spaces, architecture, art, and design to provide people with the opportunity to Experience Nature: Our aim is to draw people into this beautiful landscape, to enhance one's experience of nature through all five senses, and to allow nature itself to inspire in us an experience of awe" [47]. To reflect the client's request (i.e., experience the natural environment), SANAA made the architecture such that it does not attract attention on its own but becomes part of the landscape.

The surrounding landscape, the view from different parts of the building, is crucial. The design is intended to bring different views from each program element. Starting with the sloping auditorium, the vast landscape can be viewed, and the gym was also designed to let in light. They designed the conditions in which each space's light enters, giving each venue a unique experience: "Deep cut and shallow cut, open condition versus closed condition, steep hill versus rolling hill, symmetry versus asymmetry, and pavilion versus walkway" [48].

The relationship between the depth of the canopy and the height of the building has a role in bringing this intervention of nature into the building. SANAA placed an artificial pavement under the canopy, emphasizing the buffer zone outside and inside the design (see Figure 10). Technical support was used to introduce optimization techniques to reduce solar heat gain while maintaining daylight access through the depth of the roof overhang, and the feasibility of a radiant floor was analyzed [49].

Figure 10. The canopy of Grace Farm (source: Wikimedia commons).

4. Discussion

4.1. Depth as a Medium for Architectural Transparency

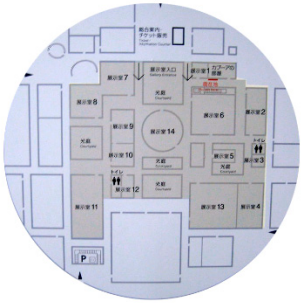
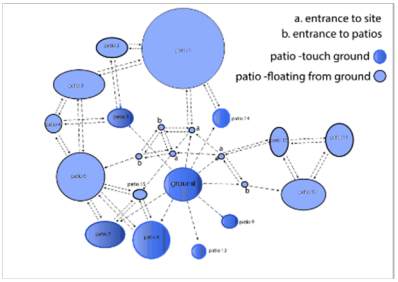
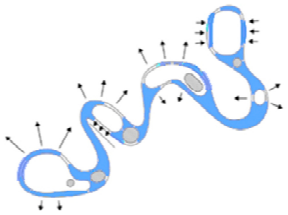
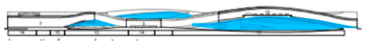
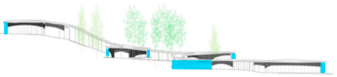
Architectural space encompasses the depth of both physical space and psychological space. We use an analysis framework to divide the phenomenological intervention through depth for architectural transparency into three factors (Table 3). First, visual perception through overlapping walls is the main medium to perceive architectural transparency. This visual perception makes people see through the architecture into its surroundings.

Second, the space-body experience forms by the way space operates between the outside and the inside. The phenomenological transparency, and not just the perception of space through the division of walls, emphasizes space as a lived human experience.

Last, natural environment cognition provides a sustainable approach to architecture. According to SANAA, architecture is a part of the overall environment; hence, they try to preserve nature around their architecture and encourage sensitivity to changes in nature [50]. Recently, SANAA attempted to fill the buffer by bringing the natural environment cognition into architecture and creating architectural transparency through Grace Farm. This medium, depth as the cognition of the natural environment, completes architectural transparency in SANAA works.

To illustrate the transparency of integrative phenomenology, we present a depth analysis based on phenomenological language in the matrix in Table 3. As the starting point of the architectural idea, SANAA experimented with the visual perception of transparency (between public and private) through the Contemporary Art Museum in Kanazawa (1999–2000), considering the idea of a buffer for the relationship between the inside and the outside. Going beyond the rigid glass boundary between the inside and the outside, in the Rolex Learning Center (2005), SANAA developed the concept of "buildings should be a beehive of activity" using architectural transparency as a buffer for human experiences. In the case of Grace Farm (2015), the natural environment cognition incorporated into the architecture is the primary medium for architectural transparency.

Table 3. The matrix for transparency in SANAA's architecture (source: authors).

Project	**Contemporary Art Museum in Kanazawa**	**Rolex Learning Center**	**Grace Farm**
Completion	**1999–2000**	**2005**	**2015**
Floor plan diagram			
Section diagram			
Primary medium through depth of architectural transparency	☑ visual perception ☐ space-body experience ☐ natural environment cognition	☐ visual perception ☑ space-body experience ☐ natural environment cognition	☐ visual perception ☐ space-body experience ☑ natural environment cognition
	✓ Focusing on Visual perception	✓ Focusing on space-body experiential perception	✓ Focusing on natural environment cognition
Phenomenology languages actively used for 'depth'	☑ visible/invisible ☑ material/immaterial ☑ inside/outside		

4.2. Sustainable Model of Architectural Transparency

Architectural value is acquired not only through visual perception but also through the experiences that the body implicitly assimilates. In addition, this process is completed on recognition of the external environment and in the architecture. Architectural transparency works in the buffer area of the inner and outer boundaries in each case. The experience a building offers allows one to experience the real world of "depth". Although depth acts as a medium for architectural transparency, eliciting people's numerous perceptions through the buffer is the most critical way architectural transparency should lead.

The depth that a Cubist painter or Merleau-Ponty wants to achieve or discover cannot be achieved by a wall that divides the surface and space. Further, it cannot be achieved with simple visual perception—but can be achieved with depth experience through body experience added to visual perception and the cognition of natural light.

Through this study, we find that phenomenal transparency is possible only when the quality of space is supported beyond the three-dimensional space of materials. The achievement of quality in this space becomes powerful when the substances of human perceptions (visual perception and experiential perception) and environmental cognition relate to each other and intersect (Figure 11). Incorporating these factors makes it possible to accomplish phenomenological transparency.

Phenomenological transparency is close to Steven Holl's poetic quality of architecture, Louis Kahn's feeling about the court, and Wim Wenders discussion about SANAA's architecture. The common theme is that several factors are intertwined for transparency, such as ambiguity in the depth of a Cubist painting. Through literature reviews and case studies, it was possible to uncover that architectural transparency develops with a clear direction. The direction is for the experience between the outside and the inside of the architecture and for bringing the natural environmental experience inside with buffers. Therefore, it can be concluded that a sustainable model for architectural transparency is consistent with the direction of phenomenological transparency.

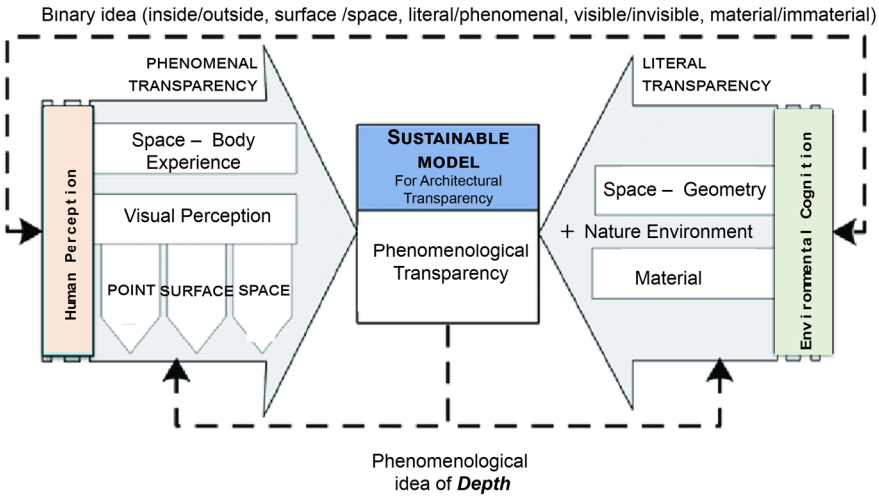


Figure 11. Sustainable model of architectural transparency (source: authors' drawing).

5. Conclusions

The study has analyzed architectural transparency, which deals with the relationship between the internal and the external spaces, as a strangely binary perspective, such as "space/form", from the early 20th century. Spatial simultaneity as architectural transparency through Cubist spatial analysis was introduced through Rowe and Slutzky's "Literal/Phenomenal Transparency". Since then, it has profoundly influenced architectural theories. However, the main problem as regards their view of phenomenal transparency is in their definition. Their binary definition cannot fully explain the human lived experience. Thus, the word "phenomenal" in architecture needs to be re-examined thoroughly. In the

field of architecture, the representational transformations of "a further level of interpretation for visual perception" (e.g., an artwork) easily fall victim to self-contradiction because architecture is not representational; rather, it is "existential".

By revisiting Rowe and Slutzky's idea of phenomenal transparency through Merleau-Ponty's idea, we realized that depth can be a medium to present the world to people and influence how they perceive it. Further, the architectural solution related to the external environment is closer to a philosophical method of existence and a qualitative perspective, allowing us to examine the hidden inner quality and the essence of life. We investigated transparency as a buffer for the depth action of each case's inner and outer boundaries through three SANAA cases. These cases have a time difference of more than five years (1999, 2005, and 2015) in building completion. Each case was an excellent example of the characterization of each element of architectural transparency through phenomenological "depth".

Similar to Merleau-Ponty's phenomenological idea, transparency encompasses the depth of both physical space and psychological space, such as material/immaterial, literal/phenomenal, and visible/invisible interactions. Significant architectural immanence is acquired not only via visual perception but also via experience implicitly taken up by the body and the cognition of the natural environment. Thus, a sustainable model for architectural transparency can be achieved through phenomenological transparency.

This study contributes to the literature in two ways. First, there is tremendous potential to conduct pilot studies to re-evaluate architectural transparency with phenomenological ideas, based on this study's findings. Next, this study could serve as a theoretical framework of architectural transparency that can flexibly respond to the rapid change in perceptions of the inside and the outside of architecture since the post-pandemic era. A limitation of the study is that it is necessary to expand the scope of cases. Through subsequent research, we will analyze the works of other architects from the perspective of phenomenological transparency.

Author Contributions: Conceptualization, E.K.; methodology, E.K. and E.J.P.; investigation, E.K. and E.J.P.; writing—original draft preparation, E.K.; writing—review and editing, E.J.P.; visualization, E.K.; supervision, E.J.P. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education (2021R1I1A1A01059949).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No data is available for this work.

Conflicts of Interest: The authors declare no conflict of interest.

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