Perceptual and Visual Void on the Architectural Form: Transparency and Permeability

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Abstract

Form, space and voids are the basic elements used in architectural design process. In this paper, the concept of void is addressed in relation to the architectural form. Voids in architectural form are classified into two main headings by examining a great number of examples in terms of the effects created on the form: cognitive and functional. Cognitive voids are related to perception and are used to create various visual effects. As the heading indicates, functional voids are created to meet certain needs and desires. We further classified cognitive voids under three sub-headings as conceptual, perceptual/visual, and sculptural/monumental. Functional voids were also divided into six sub-headings; entrance, corner, balcony/terrace, gallery/atrium/courtyard, surface, transition/circulation. Our discussion is focussed on perceptual/visual voids, which is classified under the cognitive voids. Perceptual/visual voids can be explained with two sub-concepts: transparency and permeability. Perceptual effects desired to be emphasized with the help of voids are explained by the concept of transparency, while the visual effects are explained by the concept of permeability. Although void is one of the main elements used in architectural forms, it has not been discussed in this context previously. With the selected examples, here we showed that the perceptual/visual voids classified under cognitive voids can be associated with well known architectural concepts, such as transparency and permeability. Moreover, the void classification made in this study may be useful in comprehending of architectural form.

Keywords: Form; Void; Perceptual Void; Visual Void; Transparency; Permeability

1. Introduction

1.1. Form and Space. Space and form have been present as the two inseparable concepts since the beginning of architectural activities. Since the day aesthetic and beauty concerns existed, there have been aesthetic statements on form and this process still goes on (Vitruvius 1960 [1]; Corbusier 1986 [2]; Tunali 1979 [3]; Erzen 2007 [4]). Considering the form-geometry-architecture relationship, in ancient times, square, circle and triangle were the prominent shapes. Forms deriving from these shapes were frequently used, as they were considered to be the most beautiful. Thus, basic geometrical forms were dominant in the architecture of the ancient times due to this and similar reasons (**Table 1**).

It would be insufficient to mention only the discussions about the physical dimension while dealing with the space and form concepts. It is because both form and space include semantic expressions, as well. Since ancient times, considering the use of basic forms in architecture, it can be said that the pure geometry of form has been deformed day by day, additions and deductions have increased, and the void effect created in interior and exterior space is handled not only with functional, but also formal concerns. The basic forms dominating the architecture in the course of history are reshaped based on the changes in the design perspective and are transformed under the effect of these changing design perspectives. When we examine the historical development of architecture, we clearly see that the architectural space and therefore form have undergone physical and semantic changes (Şamlıoğlu& Kuloğlu 2009) [5].

The concepts regarding space and form are moved from one to the other in the course of history. Also, this change that space and form have undergone together should be considered based on the change and development in theory, discourse, technology, material, time etc. Depending on this development and change process summarized above, architectural form is also evident to change its expressions.

Table 1. Form Concept in Ancient Architecture¹

Pyramids of Giza/Egypt ²	Parthenon/Greek ³	Colosseum/Rome ⁴	Pantheon/Rome ⁵

2. Void: as a Concept

The lexical meaning of the void is “cavity, hole, unclosed space” according to its Turkish translation “boşluk”, (URL1) [6]. And in English, it is defined as “nullity” in the dictionary. In another definition, void is “space with no bodies in” and identified as the opposite meaning of “fullness” (Hançerlioğlu 1993) [7].

Conceptually void is defined as “nonexistence, nullity”, while spatially it gains a different meaning than its dictionary definitions. Void in space is a place incorporating activity. Therefore, this void created in form based on space indeed creates a place (Şamlıoğlu & Kuloğlu 2009) [5].

Space and form have both abstract and concrete meanings. With this aspect, void in the space and form has been the subject of various studies in different dimensions. However, in most of these studies, the interpretations and discussions are generally on the form itself (Ching 2002 [8]; İnceoğlu & İnceoğlu 2004 [9]; Usta 1994 [10]).

Voids created in the form can be classified in various ways physically (Onat 1995) [11]. Void can be discussed on various examples depending on the trinity of form, function and perception (Şamlıoğlu & Kuloğlu 2009) [5]. As a result of these and other similar classifications and discussions, one of the authors of this paper came up with a classification from the idea that void is not only a concrete entity, but both a concrete and abstract concept. According to this classification, voids created in the architectural form may be visualized as shown in **Table 2** (Şamlıoğlu 2010) [12]. As seen in the table, the types of void are divided into two groups: cognitive and functional, and under these two headings, other sub-headings are classified. The corresponding arrows are used to mean that any type of void may be seen in a

single architectural form with another type of void in its own class or in another class.

Cognitive voids are related to the perception. Cognitive void classification is made based on either the effect that architect desires to create or the effect created on user by the void. These voids are classified as conceptual, perceptual/visual, and sculptural/monumental. For example; Holl’s design solution was that the Simmons Hall Building would metaphorically work as a sponge. According the **Table 2**, void type of this building is classified as conceptual void.

Functional voids are related to the usage of the space. These voids are designed for functional activities. Functional voids are classified as entrance, corner, balcony/terrace, gallery/atrium/courtyard, surface, and transition/circulation. For example; most of the buildings of Mario Botta are designed an entrance void on the building form.

According to the theoretical classification given in the **Table 2**, this paper exemplifies the void under the heading perceptual/visual voids and examines the relation of voids created in the architectural form.

Perception becomes one of the main concepts of this study. Perceiving is a process related to all senses, but the sense of vision is known to be more prominent than the other senses in this context. Visual perception, visual thinking and the relation between these concepts are the subject of a number of studies (Arnheim 1969 [13]; Gibson 1950 [14]).

In this study, perception is evaluated as a meta-heading, and in the perception process, perceptual and visual senses are the sub-headings of the process. Therefore, the perception of void is assumed to occur under all the headings given in **Table 2**, and the definition of perceptual/visual void is evaluated in this context.

Table 2. Classification of Voids.

3. Void: Perceptual/Visual

The primary purposes of such voids are to create a wealth of perception. Perceptual/visual voids provide users with various opportunities. These can be summarized as the ability to view the surrounding area from different angles, creating space for various activities, making a rich environment in terms of the user in the form itself, and thus in the space and etc.

Perceptual/visual voids directly indicate two sub-headings. These are the concepts of transparency and permeability. Although these concepts have been widely discussed on architectural buildings before, they have never been handled in the context of the void theme. However, buildings creating a perceptual void emphasize transparency, while those creating a visual void emphasize permeability.

Depending on the theoretical classification of void given in **Table 2**, can be seen the relationship between transparency and permeability concepts with perceptual/visual voids.

3.1. Void: Perceptual. Sometimes, void is not physically created in the form itself. Instead, a sense of void can be created in the whole form. On such examples, the sense of void is obtained by using the materials. The form itself might be a cube, sphere, prism and etc. While the form goes under no processes, the created effect is evident as a kind of void perception. One of the ways to enable this is to build the form using materials like glass and steel to create the void effect. Thereby, the perceptual void in

the form is actually created depending on the effect of transparency created by the material.

The transparency concept has been widely discussed and studied in the architectural literature before (Rowe&Slutzky 1963 [15]; Corrêa 2009 [16]). However, that a perception of void can be created in the form with the help of transparency has not been mentioned much. Perceptual voids directly match up with the transparency concept. In such examples, the form does not thrust itself forward as a whole, what is in the foreground is the transparency effect. For instance, when a cube, triangular prism or rectangular prism is built with a transparent material, it gets harder to perceive these prisms. Instead, the whole space is provided with a void effect. In this case, the transparency effect gets ahead of the fact that the form is perceived as a prism. The element to create this effect is transparency.

Such architectural examples are generally interpreted by critics or their designers depending on the transparency effect. This paper aims to put forth that transparency in the architectural form creates some kind of a void effect. The examples selected to explain this situation in the study are among the striking ones in the literature.

In **Table 3**, the examples where the perceptual effect of void is obtained by transparency are given in chronological order and the perceptual void effect created by transparency is explained based on the literature.

Table 3. Perceptual Voids

Farnsworth House, 1946 Mies van der Rohe		<p>At Farnsworth House, the virtues of transparency endure, pure and powerful. The house dissolves the alienating division between outside and inside, letting nature and the change of seasons become a seamless part of the experience of the building (URL2) [17]. Maritz Vandenburg has written about the Farnsworth House: “Every physical element has been distilled to its irreducible essence. The interior is unprecedentedly <u>transparent</u> to the surrounding site and also unprecedentedly uncluttered in itself (URL3) [18].</p>
The Louvre Pyramid, 1989 I.M. Pei		<p>The Louvre Pyramid may be seen as the formal element which reconciles the paired design strategies of axial deduction and generation of rotated squares just as its <u>transparency</u> may be seen as the quality which figuratively and literally establishes the relationship between the surface and underground levels of the project. The pyramid is both the lens that focuses the existing geometry of the court and the prism which translates that geometry into the subterranean space (Rustow 1990) [19].</p>
R128 House, 1998 Werner Sobek		<p>The glass and steel R128 House is located on a steeply sloped site with panoramic views of Stuttgart. Although this house seems sterile and completely <u>transparent</u>, it is a home where comfort and privacy issues for the inhabitants have been met. The design resulted from his desire to have an all <u>glass house</u> with unencumbered views of the surrounding city and countryside that would also employ contemporary engineering concepts for sustainable buildings (URL4) [20].</p>
Rose Centre: Earth & Space, 2000 Polshek Partnership		<p>The Rose Centre for Earth and Space features a large sphere housed by a <u>glass cube</u> which serves as a symbol of the building's purpose (URL5) [21]. Architect Polshek describes the design concept for the Rose Centre as a “cosmic cathedral”. The <u>transparent</u> walls are a metaphor for the revelation that science offers (URL6) [22]. Architects said of their design, “Critical to the design concept is the sphere’s apparent disengagement from the enclosing structure and from its <u>transparent</u> curtain wall (URL5) [21].</p>
Industrial Designer House, 2004 Koji Tsutsui		<p>Japanese Architect Koji Tsutsui has designed this modern house in Tokyo, Japan, for an industrial designer, with a distinctly industrial edge. Industrial Design House was planned with a living/dining area and gallery at its core, featuring a bare white backdrop and tall ceilings that invite the flood of natural light. Each room provides its own individual feel and function, but they are all interwoven via the basic elements of architecture “floor, wall, ceiling, stairs, <u>void</u> and openings,” according to Best House Design (URL7) [23].</p>

Table 4. Visual Voids

<p>Tbilisi Ministry Building, 1975 George Chakhava</p>	<p>The design is based on a concept named “Space City Method”. The idea is to use and cover less ground and give the space below the building back to nature. The architects reference was a forest, the cores are like the trunk, the horizontal parts the crowns. Between the earth and crowns there is a lot of <u>free space</u> for other living beings, which create one harmonious world with the forest. The concept was used by other architects, too (URL8) [28]. This idea also suggests the concept of visual <u>permeability</u>.</p>
<p>Le Grande Arch, 1990 J Otto von Spreckelsen</p>	<p>Danish architect Johann Otto von Spreckelsen designed the winning entry to be a 20th century version of the Arc de Triomphe: a monument to humanity and humanitarian ideals rather than military victories (URL9) [29]. This idea has transformed the building into a virtual urban door. Created <u>visual void</u> has become an element, on the historical axis of the city by use of the physical and perceptual permeability through providing support and strengthen the image of the city.</p>
<p>CCTV Building, 2004 OMA</p>	<p>Scheeren situates the CCTV within a field of spatial forces: the texture of the Forbidden City paired with the void of Tiananmen Square together constitute two strong “forces of gravity that define Beijing’s character”. The building introduces <u>accessibility</u> and accountability. The architects suggest that the building’s glass façade provides the prevailing architectural metaphor: transparency & accessibility (Mattern 2008) [30]. The huge void in middle of the form has created a visual perception and effect with a <u>big window</u> to the city.</p>
<p>Mirador Building, 2005 MVRDV</p>	<p>MVRDV is well-known for its philosophy of densification and multiple space use (URL10) [31]. The most impressive element of the building is the incredible <u>void</u> of its shape. The void is used by the neighbourhood as a meeting area and playground. The views from the void are incredible, across to the Guadarrama Mountains, because Mirador is one of the highest buildings in the area. (URL11) [32]. The big void that is created on the building form provides a different visual effect about the city environment.</p>
<p>Gas Natural Office Building, 2008 E. Miralles & B. Tagliabue</p>	<p>“That is why we have made a proposal where the interest lies in the fragmentation of the constructible volume into a series of constructions that at the end form a unified volume, which responds to different scales and in clear relation to the nearby apartment buildings. By forming a <u>great doorway</u> which allows the opening up of the district of La Barceloneta and a singular public space that brings the construction to the ground, until it forms an urban landscape of different dimensions...” (URL12) [33].</p>

3.2. Void: Visual. In such buildings, the form is shaped according to the void. The objectives include bringing the void in the foreground, rather than the building or the form, and making it perceived. The location of the building is one of the primary and important reasons to create such voids. These voids bring different perspectives to the city and the city dwellers from various directions of the building. They aim at opening a door or window to the environment surrounding them, strengthening and guiding the visual perception. In order to fulfil these objectives, depending on the situation and size of the void, permeability is tried to be created. Therefore, visual void in a sense indicates the concept of permeability.

Permeability is one of the concepts that have recently been discussed in the architectural environment. Permeability is defined in a number of ways such as “providing the option to go from one place to another” (Bentley 1985) [24], “that something can move in some other thing” (Stamps, 2003) [25] etc. and can be classified in a number of ways.

In this study, when the void is in contact with the ground, physical permeability is assumed to occur, while in other cases, perceptual permeability is assumed to be obtained. Physical permeability is thought to offer the users the options to move (Carmona *et al.* 2003) [26].

On the other hand, perceptual permeability is associated with reading, understanding and comprehending the environment. Permanent images are known to be seen in especially distinctive spaces with a high readability level (Sternberg 2000) [27]. In this sense, visual voids indicating the permeability concept are inevitably important in urban spaces.

In **Table 4**, the examples where the visual effect of void is obtained by permeability are given in a chronological order and the visual void effect created by permeability is explained based on the literature.

4. Conclusion: Perception & Void & Concepts

This study that examines the void concept in relation to geometry has made a classification and tried to explain perceptual/visual voids in the classification with the help of transparency/permeability concepts. In this context, perceptual voids are related with transparency, while visual voids with permeability. The discussions on the examples have brought about some common findings;

While studying the building examples, transparency and permeability concepts are seen to be used to explain the space in both void types. What distinguishes between these void types is considered to be related to not only conceptual, but also physical properties. It is because transparency and permeability are concepts that can occasionally be expressed in both of the void types at the same time.

Physical difference properties are about how the void is created. Perceptual voids are formed by the material use, while visual voids occur as a result of reductions made in the form. In this case, the physical difference between the two types shows itself like this: in buildings with a perceptual void, the void does not exist physically, while in buildings with a visual void, the void reveals itself in a very striking way.

In the types of perceptual void, transparency and permeability are seen to be the concepts used together from time to time in defining the form. In such examples, transparency is a concept that the form should include. The said permeability is not physical, but perceptual. In buildings with a perceptual void, that the readability level is high and distinctive features are prominent result in the occurrence of permanent images (Sternberg 2000) [27] and thus, the perceptual permeability can be mentioned.

Whereas in the types of visual void, the effect in space is explained together with the use of transparency and permeability concepts. However, the said permeability in the types of visual void is mostly a physical one; like “taking the users from one place to another” (Bentley 1985 [24]; Stamps 2003 [25]). Nevertheless, such voids might be included transparency and permeability concepts together at times.

Considering the examples, it is possible to say that the most evident feature to distinguish between the two void types is the contrast between absence and presence. Only transparency and permeability concepts are thought to be insufficient to express this difference. In the classification of cognitive voids, if the void does not exist physically, it is a perceptual void, but if it exists physically, it is a visual void.

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Notes:

¹ Drawings of all buildings in this article were prepared by Tülay Şamlıoğlu.

² Photograph: http://www.greatbuildings.com/cgi-bin/gbi.cgi/Great_Pyramid.html/cid_2203726.html

³ Photograph: http://www.greatbuildings.com/cgi-bin/gbi.cgi/The_Parthenon.html/cid_1825719.html

⁴ Photograph: KTU Designtrain Project Team Archive: Gençosmanoğlu AB., Kuloğlu N., Asasoğlu A., Italy, Rome, **2008**.

⁵ Photograph: KTU Designtrain Project Team Archive: Gençosmanoğlu AB., Kuloğlu N., Asasoğlu A., Italy, Rome, **2008**.