Drawing Flatness

WEILING HE
Texas A&M University

"If the Cubist canvas provided thought to the architects of the twenties, there may be some significance in the diamond canvases of Mondrian for architects today. The initial spatial evolution in the form of a new projected and exploded space were sought after in the Diamond Projects. Another way of looking at space and form can be adopted. The Renaissance space of perspective is a fact; the flat-shallow contained flux space of the post-Cubist canvas is a fact."[1]

Observation: The Absence of Perspectives

From this study of Hejduk's architectural drawings of the Diamond Series at the Canadian Center for Architecture (CCA), an interesting observation was made: In the entire collection, not a single perspective of these two series was drawn! The only perspective found among all the drawings at CCA was placed in the miscellaneous category. This perspective shows curvilinear walls meandering in between the column grid (Fig.1). This single existing perspective is based on a central vanishing point, appearing to be a test of two kinds of surfaces along a passage. The drawing seems to be a way in which Hejduk compared clear orientation and vague orientation in space.

Did Hejduk ever draw perspectives while he was designing the Diamond Series? Mr. Steven Hillyer, the director of the Archive Center at the Cooper Union, confirmed that he seldom did. "There are no perspective drawings of either the Wall House or the Diamond Series. That would have been completely antithetical to the nature of the work."[2]

Then why was perspective drawing eliminated from Hejduk's set of drawings? The answer to this question lies in the qualities that perspective drawings possess. As a simulated view of the space, the perspective provides an illusionary space, or what the space looks like.

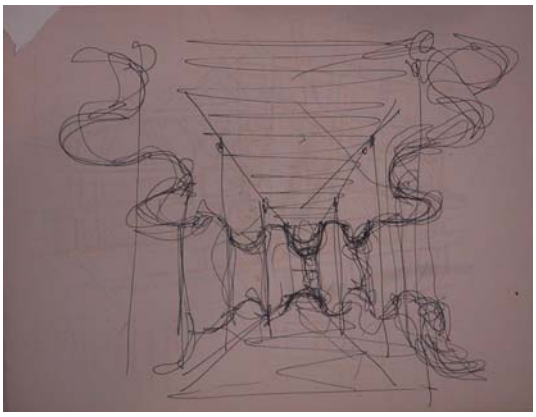


Fig.1 The Only Perspective (Photographed from CCA)

If, in the first place, he intentionally detached himself from thinking of architecture as natural appearance, what was Hejduk really trying to do? If the perspectives, as Hillyer said, had really been "completely antithetical to the nature of the work,"[3] what was the nature of his work? To Hejduk, architectural drawings were not only documents of what had been designed but also, more importantly, records of how the designs were formulated. The very convention of drawings reveals the specific way in which he approached his designs. It seems that the natural appearance of the building is hidden by Hejduk's intention of foregrounding the concept of the building.

Flatness in Oblique Projections

Drawing the diamond shape in oblique projections, Hejduk observed an interesting phenomenon.

"... When a square form in plan is drawn in isometric[4] it appears to the eye as a three-dimensional projection. When more than one floor plan is projected in isometric, it builds up quite naturally and still appears as a three-dimensional representation. When the diamond is drawn in isometric and has a plan of more than one floor, a very special phenomenon occurs. The forms appear two-dimensional; the stories overlap each other in a primary two-dimensional vision. The forms tip forward in isometric towards the picture plane; they are three-dimensional, yet a stronger reading of two-dimensionality predominates. A meshing

together of two-dimensions pushing forward is the phenomenon we are most aware of." [5]

"As Cubists in their paintings tipped objects forward towards the picture plane, the isometric projections of the diamond accomplished a similar point of view for architectural drawings. The isometric projections of the diamond are Cubist projections in architecture, therefore completing the formal relationship between Cubist projection in painting and Cubist projection in architecture… The two dimensionality of a plan, projected into the three-dimensional isometric, still appears two-dimensional, closer to the two-dimensional abstraction of the plan and perhaps closer to the actual two-dimensionality of the architectural space."[6]

These quotes indicate that the idea of two-dimensionality (flatness) interweaves with the mechanism of oblique projection (or isometric projection, as Hejduk calls it). Two-dimensionality is embedded in the specific rotation of the oblique projection of a diamond shape. Numerous scholars have claimed that Hejduk's drawings are flat.[7] However, only detailed study, not simple reference to what Hejduk said, can determine if this is true. How are Hejduk's drawings flat?

Depth in Picture-Plane

The understanding of flatness goes hand in hand with the understanding of depth. Flatness is the elimination of depth. In order to understand how flatness is constructed, we need to understand how depth is eliminated, which requires an understanding of the construction of depth first.

The flattening of space appears to Hejduk as a medium-rooted problem. In his article *The Flatness of Depth*, Hejduk looks at conception, image, representation, and realization across the media of painting, photography, film, and architecture. The major concern is how much the three-dimensional space is compressed in each of these media. Besides theoretical discussion, Hejduk uses architectural drawings as a medium to register the idea of flatness. Superficially, his architectural drawings raise the traditional question of how three-dimensional space is captured in the two-dimensional picture-plane. However, the problem of flatness is not as simple as compressing three dimensions into two. One cannot assume that a two-dimensional representation represents more flatness than a three-dimensional space. For example, a perspective on a picture-plane may indicate much deeper space than the real space of a cube. Thus, depicting depth in a picture-plane does not necessarily indicate flatness. Therefore, one has to distinguish the depth existing in space and the depth suggested in the picture-plane. The former is a real spatial dimension. The latter is a depiction of the former.

Depth in Projection Systems

A projection system relates a three-dimensional object to its two-dimensional image on the picture-plane. The image of the object possesses different degrees of illusionary depth. Of importance is that in a projection system, the only means of suggesting depth is by lines instead of by shades and colors.

Three major types of projection systems—orthographic (Fig.2a), oblique (Fig.2b), and perspective (Fig.2c) —differ with regard to the relationship of the projectors to the picture plane. In orthographic projection, the projectors are perpendicular to the picture plane; in oblique projection, the projectors are oblique to the picture plane; and in perspective projection, the projectors go towards a specific point called the station point, which represents a single eye of the spectator.

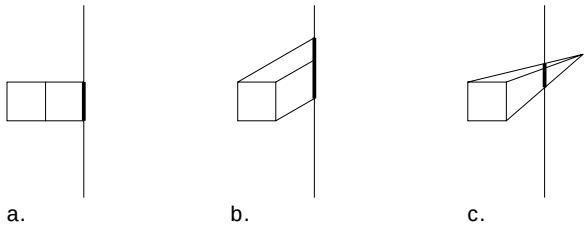


Fig.2 Projection Systems

How is depth represented in projections? All three major projection systems tend to provide an illusionary appearance of an object. However the degrees of the illusions are different in terms of how close the projection

principles are to the generation of an actual view in space. We assume that the closer the relationship is, the more realistic the projection becomes. Among the three, perspective projection provides the closest appearance of an object to a viewer's perception. Orthographic projection assumes a perpendicular view; however, it denies the single viewpoint. Oblique projection assumes a tilted view, not only denying the single viewpoint but also assuming the viewer's visual angle is unlimited. The angle that the oblique projectors create with the picture-plane determines the lengths of the receding lines. However, the principal face, which is parallel to the picture plane, always retains its true shape. By breaking more and more rules of perception in reality, the projection system moves away from providing realistic appearances and towards providing explanatory images. The latter more explicitly reveals the logic of the space.

Although projection systems determine how realistic the projections are, they do not determine how deep or flat the space appears in the projection. For example, depicting an object in perspective requires that the viewpoint determine how much depth is revealed. A frontal perspective depicts only one surface of the cube, which does not provide any sense of depth at all. If the viewpoint is moved to the side of the cube, its depth is obvious. Hence, the representation of depth also depends on the revealed number of orientations.

Depth in Drawing Elements

In projection systems, we looked at how real depth is represented on a picture-plane. Here, we will take a slightly different approach by looking at the drawing elements only and seeing how they suggest depth. In this way, drawing elements are examined as autonomous agents rather than representations.

Depth is created through comparison in reality and in drawing. Drawing elements may suggest depth through their relative sizes, positions, or other attributes that are independent from an actual projection image. Here we will refer to Gyorgy Kepes' Language of Vision, This book, published when Hejduk was in school in 1944, provides important insights into visual theory. Although we cannot ascertain if Hejduk was directly influenced by this book, it does provide an excellent sample of how two-dimensional compositions and their visual effects were discussed.

Apart from perspective, Kepes discusses three other ways of constructing depth in a picture-plane. First, depth is constructed in the vertical relationship of position. In a vertical location, the object that is closer to the bottom indicates a position closer to the viewer. However, this way of constructing depth only corresponds with a bird's eye view perspective in which the horizon is above the objects. Normal perspective or a frog's eye view may show objects that are closer to the viewer in the position that is closer to the top of the view.

Second, depth is constructed in the relationship of overlapping. The figure that intercepts the visible surface of another figure is perceived as closer. Figures appear parallel with the picture-plane and tend to establish a receding spatial relationship.

Third, transparency indicates not only an optical order but also, more importantly, a spatial order, that is, the fluctuation of space. "The position of the transparent figures has equivocal meaning as one sees each figure now as the closer, now as the further one." [8]

Kepes' discussion is intriguing, as it indicates that none of the three ways of suggesting depth is a result of the mechanism of projection. However, understanding them is, in fact, tied to the understanding of projection. For one, the vertical position can be seen as that which is in normal perspective. Below the line of sight, objects that are closer to the viewer always appear lower on the picture of perspective. The overlapping situation can be seen as a normal orthogonal projection whereby objects that are further are always blocked by objects that are closer. Moreover, the reason why transparent figures are ambiguous in terms of depth is that the projection rules do not work anymore. The viewer loses his or her reference of judgment.

Although not mentioned by Kepes, another drawing element that may suggest depth is the angle of lines. A single line may or may not suggest obvious depth. Theoretically, a line can always be associated with depth because it suggests numerous conditions with depth in three-dimensional space but only one condition

without depth when this line is parallel to the picture-plane. However, some lines suggest even stronger perspective than others—those that are neither horizontal nor vertical on a canvas. This is due to visual illusion because the majority of lines projected in perspective are neither horizontal nor vertical. The association of non-orthogonal lines with perspective then leads to depth.

Depth Compressed

Based on the previous discussion, we understand how depth can be constructed in the medium of drawing. Let us put Hejduk's architectural drawings within this framework. How are his drawings flat?

Oblique projections are used in every individual project of the Diamond Series. In these drawings, it is peculiar that one sees only "two sides" of the "diamond" (one plan and one elevation) as opposed to three sides (one plan and two elevations). Because of the absence of the third side, the diamond object becomes a flattened picture. This effect was in fact intended by Hejduk.

"When a diamond form in plan is projected by isometric it becomes a square."[9] This particular effect came from Hejduk's observation of Mondrian's tilting the canvas by 45 degrees as an answer to Theo Van Doesburg's rotating the inner grid by 45 degrees (Fig.3a. 3b). The difference between Van Doesburg's rotation of the inner grid and Mondrian's rotation of the periphery of the canvas is signficant. Hejduk's observation of oblique projection also involves rotation, but essentially rotation in three-dimensional space. His diagram of oblique drawings can be understood only in a virtual three-dimensional space. However, the rotation of the diamond flattens the space since it comes back to the horizontal-vertical appearance, which is identical to a flat square in a flat picture plane. Hejduk's well-known diagram most clearly illustrates the action of rotation and flattening (Fig.3c). As one would expect, the oblique drawings of Hejduk's Diamond Series are all constructed by rotation so that the diamond plans overlap and stack up as squares. One sees only the plan and one elevation of the diamond building.

What differentiates Mondrian's rotation from Hejduk's rotation is the media in which they work, so the rotations differ in meaning.

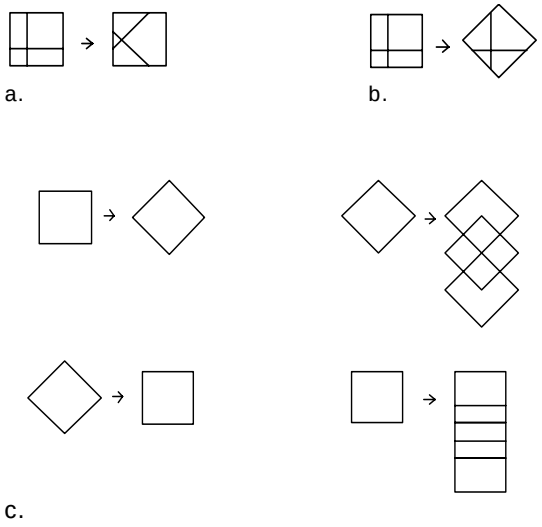
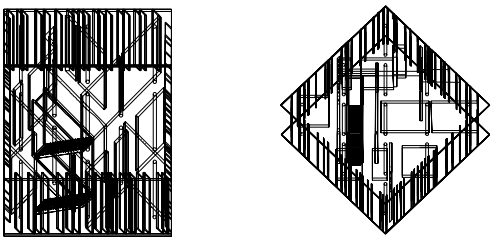


Fig.3 Van Doesburg's Rotation, Mondrian's Rotation and the Rotation in Hejduk's Diagrams (Reproduced from *Mask of Medusa*)

Mondrian's rotation occurs on a two-dimensional picture-plane while Hejduk's occurs in three-dimensional space. Moreover, Hejduk inherited the flatness of space by operating three-dimensional objects while creating a "two-dimensional" appearance.

The Diamond Series is peculiar due to the 45-degree rotation of the inner grid to the edge. Because of this rotation, two possible oblique projections can be made in order to compress the three-dimensionality of the object. Hejduk already used one way—to rotate the diamond object by 45 degrees when projecting it on the picture-plane. (Fig.4a) The other way is not to carry on the rotation so that the diamond object is projected orthogonally onto the picture-plane (Fig.4b). Both ways of projection reveal the contrast between two- and three-dimensionality. In Hejduk's case, the overall profile of the diamond is flattened while the



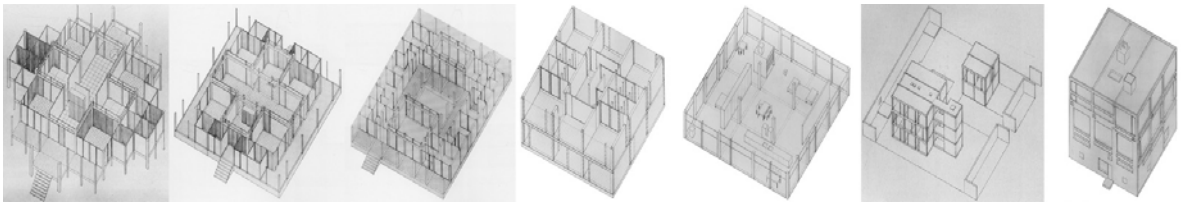
a. 3D in 2D b. 2D in 3D

Fig. 4 Two Possible Oblique Projections

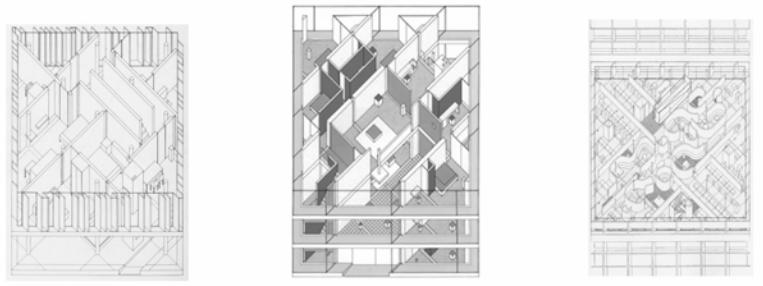
inner partitions are depicted in three dimensions. In the other case, the overall profile maintains three dimensions while the inner partitions are flattened. In simple terms, Hejduk's projection is 3D in 2D while the projection without rotation is 2D in 3D. The fact that Hejduk chose 3D in 2D as opposed to 2D in 3D reveals his focus on the diamond edge and the configuration.

Even more interesting are the different degrees of the building objects in relation to the picture-plane among the Texas Houses (Fig.5a), an important series before the Diamond Series (Fig.5b), and the Wall House Series (Fig.5c), which came after the Diamond Series. All the oblique projections of the Texas House Series are a conventional 30-60 degrees while all the Wall House Series oblique projections are 0 degree. As one can imagine, the oblique projections of the Texas House Series carry a strong sense of three-dimensional depth of space. The oblique projections of the Diamond Series and those of the Wall House Series are flat.

The gradual change among the oblique drawings of these three series is toward a clearer and clearer intention of compressing three-dimensional space in two dimensions. Both the Diamond and Wall House Series have the same flattened oblique drawings. However, flatness in the Diamond Series is achieved by exploiting the 45-degree rotation of the diamond plane. In a completely different manner, flatness in the Wall House Series is achieved by not rotating at all. Thus, the intention of creating flatness in drawings is



a.



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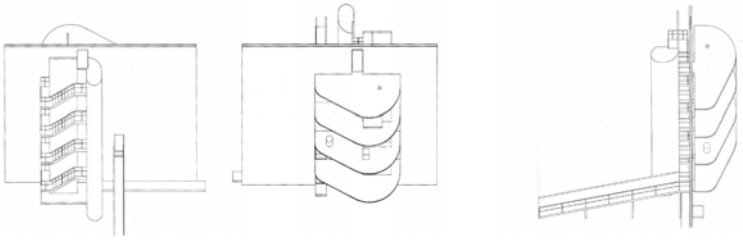

c.

Fig. 5 The Changes in Oblique Projections of Hejduk's Early Series
(Reproduced from *Mask of Medusa*)

most clearly revealed.

Besides the 45-degree rotation, Hejduk also challenged the conventional assignment of line weight. According to convention, the depth of a drawing can be enhanced by contrasting line weights. A hierarchy of line weights can distinguish between spatial edges, planar corners, and surface lines. Hejduk used only line weight in his oblique projections, so depth was further denied.

Conclusion

Hejduk's oblique projections are undeniably flatter than conventional oblique projections, in which depths are minimized, but they still exist. In the Diamond Series, as we discussed before, the elements within the boundary are three-face oblique projections. Further, the overlapping relationships among the elements still suggest near and far and hence, depth. If overlapping is taken into consideration, we cannot argue that the boundaries of the Diamond Series exemplify strict flatness. Although by rotation, all the diamond boundaries appear to be squares in oblique projections, their overlapping, one on top of the other, still embeds the idea of depth.

The important issue is not whether Hejduk's oblique drawings are completely flat, but if they depict the idea of compression, not only from three-dimensional space to two-dimensional projection and in a seemingly two-dimensional composition, but also, more importantly, in plans and elevations within the same organization. It is noted that in all of Hejduk's two-face oblique projection drawings, a top plan is organized adjacent to an elevation without foreshortening.

The juxtaposition of plan and elevation is significant in that it demonstrates another level of compression in drawing. In architectural drawing, a plan signifies the cognitive aspect of space. It reveals, in the most complete sense, relationships that cannot be seen. Therefore, a plan is not about situated experiences within the space; it is about the understanding of space as a whole, a concept of the space. An elevation represents the visible. One sees the elevation even though it is distorted in most cases. To some extent, elevation is a percept. Conjoining these two kinds of depictions in a "flat" organization indicates setting the contrast to an extreme degree between architecture as a set of concepts and architecture as a set of percepts. Is this not the theoretical exploration of Hejduk and of architects in general? One understands architecture and raises it on a conceptual level, but understanding is deeply rooted within the percepts in space. Hejduk's two-face oblique projection drawings make a clear statement of these differences.

Notes

[1] Hejduk, John. *Mask of Medusa: Works 1947–1983*. New York: Rizzoli, 1985. p 48.

[2] From email to the author on February 05, 2004.

[3] Ibid.

[4] Some architects use "axonometric projection", "isometric projection" and "oblique projection" as synonyms while the author will follow a strict naming convention.

[5] Hejduk, John. *Mask of Medusa: Works 1947–1983*. New York: Rizzoli, 1985. p 48-49.

[6] Hejduk, John. *Mask of Medusa: Works 1947–1983*. New York: Rizzoli, 1985. p 49.

[7] Publications such as Architecture Digest in the article "Art: Architectural Drawings: The grace of fine delineation" (1978) and Eleni M. Constantine's John Hejduk: Constructing in two dimensions (1980), are among the earliest discussions on this matter. The latter article acknowledges that Hejduk's drawings and architecture are characterized by two-dimensionality.

[8] Kepes, Gyorgy. *Language of Vision*. Paul Theobald, 1951. p 77.

[9] Hejduk, John. *Mask of Medusa: Works 1947–1983*. New York: Rizzoli, 1985. p 49.