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Book Review

Javier Navarro de Zuñillaga

Forma y Representación. Un Análisis Geométrico

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If I had to summarize what this book is about in a few words, I would say that it is about the geometry of the form and its representation in perspective (as the title says, Form and Representation). It is an interesting and enlightened book comprising five chapters and an appendix, which turns out to be another chapter written by Juan Chamorro Sánchez. The thematic of the book embraces an ample number of topics over its five chapters. Sometimes the topics seem to be repeated, but within a different context, as for instance “scale and proportion” and “representation and scale”; a careful reading of the index makes the contexts clear. Because of the extent of the topics the book is recommended as a general reading on geometry and perspective.

In Chapter 1, the author begins with the notions of human body, space, and geometry. Here, the course of the ideas and illustrations are discussed generally, describing the principles of scale and proportions in nature, architecture, astronomy, and art. It continues with the notions of movement, and visual perception of space and of objects. In a simple manner the author explains how a line, a plane, and a sphere are generated by respectively translating points and lines, and rotating a radius. At this point, the author remarks on the origin of projective geometry during the Renaissance, when a plane intersecting the cone of vision captured the image of the observer. A fundamental principle of perspective first established by Alberti in his treatise *Della Pittura*, in which the intersecting plane of the visual pyramid (or cone of vision) is called a “*finestra*” (window).

Form and Representation is the theme of Chapter 2. It begins with a definition of “form” and its classification in three kinds: natural form, geometric form, and created form. These three species relate to “representation” in many ways which in turn generate systems and models of representation. In this section, the illustrations vary in gender and epoch, thus paintings, analytic figures, geometric outlining, or scientific images were selected to enhance the author’s idea about systems of representation. Of course, I could not agree more with the author’s choice of Piero’s *Città Ideale* as one of the paramount examples of created form. Languages of representation imply the knowledge of perspective, colors, and models. The language of line as a perspective system is behind Velázquez’s *Las Meninas*, as the author points out. Instead, in architecture, or scenography, the language of representation used, whether 2D or 3D, would have to

produce tangible things in the end. For example, a scenography design in 3D with a perspectival effect is literally intended to construct an object in perspective: a perspective-object to be seen in perspective once it is settled in place, such as the seven streets of the city of Thebes in Palladio's Teatro Olimpico.

Chapter 3 is devoted to the Geometry of the Plane. Here the author introduces the following notions: geometrical plane, measure systems, scales, and proportions. In particular, the construction of regular figures on a plane, and how they are used to conform architectural elements, or serve as layouts in art, decoration, and graphic design, is presented by means of well-selected examples. While a plane is theoretically infinite in geometry, it is finite for art and design. However, a real plane, or a material one, can sometimes be ambiguous, such as the Alhambra mosaics that can virtually expand indefinitely, despite of their being confined within walls. Next, it continues with the notions of prisms, polygons, networks, and how they are used in architectural design to modulate the walls, floors, ceiling, and windows. In art, the concept of the infinite within a finite plane is illustrated by Escher's works.

The Geometry of the Space is the theme of Chapter 4. Here the author introduces the idea of "plastic space", a "space" based in the real space feeding the imagination of the artists in the creation of plastic forms. In other cases, a geometrical form turns out to be a built structure, as the equilateral pyramid of the Louvre, with its base opened and faces thoroughly modulated by thinner pyramids. Partially visible, the dodecahedron structure housing Dalí's *Last Supper* is a remarkable example of a "plastic space" created in painting. Polyhedra are the main topic along this chapter in regard to its application in art and architecture. In addition, some geometrical operations of polyhedra, such as axial rotation, symmetry, projective views, sectional views, combination, inscription, circumscription, duality, and intersection, are explained. To complete this topic, the author gives special attention to describing the geometry of the sphere, and so of radial surfaces, warped surfaces, surfaces of revolution, modular networks, and the conics.

The title of Chapter 5 is Systematic Representation. Here, some of the topics discussed in previous chapters come together under the idea of "representation". Switching from 2D to 3D, and vice versa, from 3D to 2D, the author explains how central and parallel projection sometimes produce ambiguities or impossible figures. When one sees a figure representing a square, a triangle and a sphere, it also represents a cube, a pyramid, and sphere, depending on our level of perception. For instance, when looks at a rhomboid, it takes a little while to realize that it can also be seen as a cube in perspective. The so-called projections – orthogonal, perspective, dihedral, axonometric, plane-rotated, with their corresponding variants –, are at the core of what the author calls "systematic methods of representation." In this chapter, the author expands on the topic of perspective, illustrating different geometrical methods of representation, referring Piero's *De Prospectiva Pingendi*, Bosse's *Traité des Pratiques Géométrales*, Monge's *Géométrie Descriptive*, Dubreuil's interpretation of Leonardo's window, Dürer's windows, Saenredam's view of the Great Church of Harlem, Peruzzi's Villa Farnesina, and some examples of anamorphic perspective. It then continues with a theory of shadows in perspective that includes a sphere in dihedral projection with its own degraded shadows, while another example shows a sphere casting its shadow on a plane. This chapter concludes with diagrammatic representation, a topic not often discussed.

The appendix, entitled Virtual Space, is essentially another chapter, as mentioned above. It is well placed as an appendix since it deals mainly with computer graphics. The

idea behind virtual space lies in the algorithms created by a programmer-designer. If we were asked to put together all the geometries known up to the present day, we would find ourselves in serious trouble. Without pursuing the solution of this conundrum, this is exactly what computer graphics has done. Computer graphics makes it possible to manipulate all kind of projections (orthogonal, perspective, etc.), and to construct any desired view of an image in 2D or 3D. Instead of the artist's hand, it is now an algorithm that easily controls the modeling process of a simple wireframe image until it is finally transformed into a hyperrealistic image. The known geometries, such as Euclidean, perspective, trigonometry, analytic, descriptive, fractal, affine, polyhedra, all seem to become as one through the invisible language of computers. My conclusion after reading this chapter is that, nevertheless, behind the new visual world created by the computer something is missing; only drawings done by hand can enhance our creativity while computers appear not to improve it. Computers are very powerful tools, but our brains are still more powerful, so leave the creative job to our brains and let computers do the rest.

I highly recommend reading *Forma y Representación*. Since the aim of the book is to give a general notion of all the subjects discussed, many topics regarding geometry and perspective are dealt with, with no pretense of going into each one of them exhaustively. The illustrations themselves become almost like a second book, suggesting themes of further investigation to the reader.

About the reviewer

Tomás García-Salgado received his professional degree (1968), Master's degree and Ph.D. (1981-1987) in architecture. He is a formal researcher in the Faculty of Architecture of the UNAM (México), and holds the distinction as National Researcher, at level III. Since the late 1960s, he has devoted his time to research in perspective geometry, his main achievement being the theory of Modular Perspective. He also has several works of art, architecture, and urban design. More information regarding his work is available at <http://perspectivegeometry.com>.