

Questions of representation

The poetic origin of architecture

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Despite all the excitement about digital media, it is still impossible to argue that the integration of these concerns in the production of architecture has had an automatic positive effect on our built environment. The digital 'avant-garde' has degenerated into a banal mannerism, producing homogeneous results with little regard for cultural contexts all over the world. Clearly such means of representation are here to stay, and this poses enormous questions. Addressing primarily our vision (and not other senses of embodiment), experimental video, computer-graphics and virtual images have transformed our conceptual understanding of reality. Monopolising the discourse surrounding visual representation, discussions around the so-called 'digital revolution' often exclude more primary issues of meaning and ethics.

Paradoxically, the fragmentation and temporalisation of space initiated by film montage and modernist collage that opened up a truly infinite realm of poetic places for the human imagination still await their translation into architecture. During the last two decades, the seductive potential of virtual space has expanded beyond all expectations, through both technological breakthroughs and artistic endeavours, yet the architectural profession is still reluctant to question certain fundamental premises concerning the transparency and homogeneity of its means of representation.

* Architectural conception and realisation usually assume a one-to-one correspondence between the represented idea and the final building. The fact that digital media also make this literal transcription more feasible through automation and robotics has resulted in an unwillingness to question this premise. Absolute control is essential in our technological world. Although drawings, prints, models, photographs and computer graphics play diverse roles in the design process, they are regarded most often as necessary surrogates or automatic transcriptions of the built work. To disclose appropriate alternatives to the ideological stagnation plaguing most architectural creation at the end of the second millennium, the first crucial step is to acknowledge that value-laden tools of representation underlie the conception and realisation of architecture. *

The process of creation prevalent in architecture today assumes the conventional set of projections, at various scales from site to detail, adds up to a complete, objective *idea* of a building. It is this assumption of the *ideal as real*, a conceptual inversion with roots in early Western modernity, that constitutes the first stumbling block. Whether the architect is effectively or legally responsible for the production of construction documents (working drawings), the assumption remains. These projective representations rely on reductive syntactic connections, with each projection constituting part of a dissected whole. They are expected to be absolutely unambiguous to avoid possible (mis)interpretations, and to function as efficient neutral instruments devoid of inherent value other than their capacity for accurate transcription. The architectural profession generally has identified architectural drawing with such projective tools.

The descriptive sets of projections that we take for granted operate in a geometrised, homogeneous space that was construed as the 'real' space of human action during the nineteenth century. Our implicit trust in the application of a scientific methodology to architecture derives from techniques prescribed by Jean-Nicolas-Louis Durand in his *Précis des Leçons d'Architecture* (1802 and 1813). Durand's *Mécanisme de la composition* was the first design method to be thoroughly dependent on the predictive capacity of these projections. For him, descriptive geometry was the modus operandi of the architect. Although descriptive geometry promoted simplistic objectification, this projective tool is a product of a philosophical tradition and technological world-view that defines the European nineteenth century and leads to our own 'world order'. It is, therefore, not something we can simply reject or pretend to leave behind. As Hubert Damisch has pointed out recently in his tour de force on the origins of perspective, the destructuring of perspectival depth by the avant-garde in twentieth-century art has not prompted our culture of television and cinema to make the projective distance 'a thing of the past'. In architecture, the issue is rather to define the nature of a 'depth' that the work must engage in order to resist the collapse of the world into cyberspace, a depth that concerns both the spatial or formal character of the work, and its programmatic, temporal or experiential dimension.

The technological world has generally embraced the pragmatic capacity of architectural drawing over its potential to construe a symbolic order. For architects it is important to remember that a symbol is neither a contrivance nor an invention, nor is it necessarily a representation of absolute truths or transcendental theological values. Symbols embody specific historical and cultural values, and buildings often possess experiential dimensions that cannot be reproduced in a conventional representation. Expecting architectural representations to embody a symbolic order – indeed, like any other work of art – will seem controversial unless we revise the common assumptions about art and its relationship to human life that have been with us since the eighteenth century. For architecture the difficulty of manifesting a symbolic order is necessarily double, since it concerns both the project and its 'translation' – an unfolding that is seldom present in other arts.

Projective drawing need not be a reductive device, a tool of prosaic substitution. Projection evokes temporality and boundaries. Defining the space between light

and darkness, between the Beginning and the Beyond, it illuminates the space of culture, of our individual and collective existence. Closer to the origins of philosophical history, projection was identified with the space of representation, the site of ontological continuity between universal ideas and specific things. The labyrinth, that primordial ground plan and image of architectural endeavour, is a projection linking time and place. Representing architectural space as the time of an event, the disclosure of order between birth and death, in the unpredictable temporality of human life itself, the labyrinth was literally the hyphen between idea and experience, the figuration of a place for human culture, the Platonic *chora*. Like music, realised in time from a more or less 'open' notation, inscribed as an act of divination for a potential order, architecture is itself a projection of architectural ideas, horizontal footprints and vertical effigies, disclosing a symbolic order *in time*, through rituals and programs. The architect's task, beyond the transformation of the world into a comfortable or pragmatic shelter, is the making of a physical, formal order that reflects the depth of our human condition, analogous in vision to the interiority communicated by speech and poetry, and to the immeasurable harmony conveyed by music.²

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Since the inception of Western architecture in classical Greece, the architect has not 'made' buildings; rather, he or she has made the mediating artefacts that make *significant* buildings possible. These artefacts – from words, to many kinds of inscriptions and drawings, to full-scale mock-ups – have changed throughout history. Changing has also been their relation to buildings. As late as the Renaissance, for example, the only drawings truly 'indispensable' for building (from a technological standpoint) were *modani* or template drawings, considered nevertheless important enough by their authors to be carefully protected from unscrupulous copying.

For architects concerned with ethics and not merely with aesthetic novelty, who seek the realisation of places where a fuller, more compassionate human life might take place, the appropriateness of mediating artefacts and tools is paramount. Architectural traditions are rich in potential lessons and alternatives. History offers ample evidence for an architecture resulting from a poetic translation of its representations, rather than as a prosaic transcription of an objectified image.

There seems to be an intimate complicity between architectural meaning and the modus operandi of the architect, his or her *praxis* at all levels, from abstract and ethical concerns to practical and technical issues. There is also a relationship between the richness of our cities as places propitious for imagery and reverie, as structures of embodied knowledge for collective orientation, and the nature of architectural *techne*, that is, differing modes of architectural conception and implementation. These relationships can never be grasped as merely causal, obeying some clear principle of mathematical logic. It is clear that the meaning of an architectural work is never simply the result of an author's will. In addition to the complex factors that contribute to bring to life an absent building, once the work occupies its place in the public realm, a multitude of additional considerations related to context, use, cultural associations, etc., have an impact on how it is perceived. Nevertheless, the architect responsible for initiating the dream cannot abdicate responsibility. The changing

relationships between the intentions of architectural drawings and the built objects they describe hold important lessons for architects in order to exercise ethically the personal imagination and construe a better, richer place for human dwelling.

Prior to the Renaissance, architectural drawings were rare, certainly in the sense that is familiar to us. In the Middle Ages, architects did not conceive of a *whole building* and the very notion of *scale* was unknown. Gothic architecture, the most 'theoretical' of all medieval building practices, was fundamentally a constructive practice, operating through well-established traditions and geometric rules that could be applied directly on site. From the footprint of a building, construction proceeded by rhetoric and geometry, raising the elevation as discussions about the building's physiognomy continued, almost until the end. The master mason was responsible for constructing a model of the city of God on Earth; only the Architect of the Universe, however, possessed a comprehensive fore-knowledge of the project and was deemed capable of concluding the work at the end of Time. The various expressions of Gothic cathedrals were the result of different generations and diverse methods applied by itinerant bands of stone masons who migrated around Europe to work on various building projects. Multiple styles, as in the Cathedral of Chartres, or compromised geometric systems, as in Milan Cathedral, were regarded not as an inconsistency but as a layering of different responses to structural or symbolic problems during the course of construction.

Starting with the Renaissance, the relationship between architectural drawings and the buildings they describe should be considered with greater care than has been customary. From the most important architectural treatises and their respective contexts, it is evident that the maturation from architectural idea to built work was less systematised than we now take for granted. During the early Renaissance, the traditional understanding of architecture as a ritual act of construction had not been lost. The concept of a sympathetic universe, thoroughly alive, was prevalent throughout the fifteenth and sixteenth centuries. Different orders of reality – from a stone to God, from a point to a three-dimensional solid – were connected by a chain, by erotic links or *vincoli*. While this concept was based on the old Aristotelian cosmology, it was increasingly open to manipulation by magician-architects interested in propitiating a happy life, emulating the order of the heavens. This cultural context obviously demands a qualification of the 'instrumentality' of the tools or drawings of the architect. Projecting the geometric physiognomy of a building or city was a prophetic act, a form of conjuring and divining as we are told by Marco Frascari, and involved much more than the personal will of the author. Architectural drawings crystallised the miraculous power of the imagination and were therefore value-laden, never understood as neutral artefacts that might be transcribed unambiguously into buildings.

During the early Renaissance, Filarete discussed in his treatise the four steps to be followed in architectural creation. He was careful to emphasise the autonomy among proportions, lines, models and buildings, describing the connection between 'universes of ideation' in terms analogous to an alchemical transmutation, not to a mathematical transformation. Unquestionably, however, it is during the fifteenth

century that architecture came to be understood as a liberal art, and architectural ideas were thereby increasingly conceived as geometrical *lineamenti*, as bi-dimensional, orthogonal projections. A gradual and complex transition from the classical (Greco-Arabic) theory of vision to a new mathematical and geometrical rationalisation of the image was taking place. The medieval writings on perspective (such as Ibn Alhazen, Alkindi, Bacon, Peckham, Vitello and Grosseteste) had treated, principally, the physical and physiological phenomenon of vision. In the cultural context of the Middle Ages, its application was specifically related to mathematics, the privileged vehicle for the clear understanding of theological truth. *Perspectiva naturalis*, seeking clear vision for mankind, was not concerned with artistic representation, but with an understanding of the modes of God's presence; it was part of the *quadrivium* of liberal arts, associated by Thomas Aquinas to music as visual harmony, and never to drawing or any other graphic method. Humanity literally lived *in* the light of God, under God's benevolent gaze, the light of the golden heaven of the Byzantine frescoes and mosaics, or the sublime and vibrant coloured space of the Gothic cathedrals.

The new understanding of a perspectival image in the Renaissance remained directly related to the notion of classical optics as a science of the transmission of light rays and to its underlying metaphysics. The pyramid of vision, the notion on which the Renaissance idea of the image as a window on the world was based, was inherited from the Euclidean notion of the visual cone. The eye was believed to project its visual rays onto the object, with perception occurring as a dynamic action of the beholder upon the world. Vitruvius (first century BCE) had discussed the question of optical correction in architecture as a direct corollary of the Euclidean cone of vision, demonstrating an awareness (also present in some medieval building practice) of the dimensional distortions brought about by the position of an observer. The issue, however, as is well known from the great examples of classical architecture, was to *avoid distorted perception*. Architects were expected to correct certain visual aspects (by increasing the size of lettering placed on a high architrave, for example), in order to convey an experience of perfect adjustment or regularity to synaesthetic perception, always primarily tactile. Renaissance architectural theory and practice never questioned this aim, which remained unshakeable until Claude Perrault's theoretical revolution at the end of the seventeenth century.

Neither did certain fundamental assumptions about perception change during the Renaissance. When queried about the truth of parallel lines, anyone would have answered that obviously, in the world of action, those straight lines *never* meet. The hypothesis of a vanishing point at infinity was both unnecessary for the construction of perspective, and ultimately inconceivable as the reality of perception in everyday life. Alberti's central point (*punto centrico*) of the perspective construction, for example, is often wrongly associated with such a 'vanishing' point. In fact the point of convergence in the *costruzione legittima* is determined and fixed by the point of sight as a 'counter-eye' on the 'window' or, in contemporary terms, the central point on the picture plane. Even though fifteenth-century painters were experimenting with methods of linear perspective, the geometrisation of pictorial depth was not yet

systematised and did not immediately transform the quotidian experience of the world, nor the process of architectural creation. It was impossible for the Renaissance architect to conceive that the truth of the world could be reduced to its visual representation, a two-dimensional diaphanous section of the pyramid of vision.

During the sixteenth century, treatises on perspective tried to translate the primarily empirical understanding of perspective into a system, and became increasingly distanced from treatises on optics. These new works, however, remained theoretical or mathematical elucidations and had almost no practical use in prescriptive representation. In Vignola's *Due Regole della Prospettiva Pratica*, a 'second observer' was introduced and became the distance point that allowed for a mathematical regulation of the foreshortening. The distance point was projected on the picture plane, on the horizon line at a distance from the central point equal to the distance between the eye of the observer and the plane of the image. In other words, Vignola's method introduced a second observer at the same distance from the central point, looking perpendicularly at the beholder, thereby adding an element essential for the representation of stereoscopic vision. Prior to this, with the apex of the cone of vision as a simplified eye, *perspettiva artificialis* had been, strictly speaking, a (very imperfect) monocular construction.

Before Dürer, a plan was generally conceived as a composite 'footprint' of a building, and an elevation as a face. Vertical or horizontal sections were not commonly used before the sixteenth century. It should not come as a surprise that perspective's emphasis on the truth of perception being a section through the cone of vision would be translated as a new emphasis on the importance of sections in architectural representation. Sections became the legitimate embodiment of architectural ideas, precise as composite drawings could not be, and therefore more adequate to embody a Platonic conception of truth. Yet, early use of sections betrays a fascination with the role of buildings as gnomons or shadow tracers. Vincenzo Scamozzi's design for the Villa Bardellini, in his *Idea dell'Architettura Universale*, is a fascinating instance. The coordination of the vertical and horizontal sections of the building reveal light and shadow as constitutive of the architecture's symbolic order, very much in the spirit of Vitruvius who had introduced gnomons as one of the three artefacts within the province of architecture, together with *machinae* and buildings. The possibility of taking measure of time (and space), in the sense of poetic *mimesis*, was the original task of the architect, and this hadn't been forgotten in the Renaissance. There was an overlapping of the notion of section as shadow or imprint, revealing the order of the deity, the presence of *light*, with that of section as a cut. The obsession to reveal clearly the insides of bodies, to magnify and dissect as a road to knowledge, is one that takes hold of European epistemology only after the mechanisation of physiology in the seventeenth century. Only then, light as divine emanation, as 'lighting' making the world of experience possible, indeed, as *projection*, becomes a passive medium, to the exclusion of shadows. Today, many architects remain fascinated by the revelatory power of cutting, but it is clear that in science this operation has reached its limits. Further cutting in biology, or particle smashing in physics, does not reveal a greater interiority.

More light without shadows is of no use. We are always left on the outside by objectified vision, and the architect at the end of modernity must clearly understand this if the 'enframed' vision is to be transcended. Understanding the nature of projections as ephemeral, dynamic and endowed with shadows may generate an architecture once more experienced as a flowing musical composition, in time, while the spectator glances compassionately at its material surfaces.

During the sixteenth century in Northern Italy, Daniele Barbaro, Palladio's friend and patron, emphasised that perspective was *not* an architectural *idea* in the Vitruvian sense. We may recall that in Vitruvius's *Ten Books*, the Greek word 'idea' refers to the three aspects of a mental image (perhaps akin to the Aristotelian *phantasm*) understood as the germ of a project. These *ideas* allowed the architect to imagine the disposition of a project's parts: *ichnographia* and *orthographia* would eventually be translated as plan and elevation, but do not originally involve the systematic correspondence of descriptive geometry. In his treatise on perspective, Barbaro offers a fascinating commentary on the Vitruvian passage. He believed that the translation of ³*sciographia* (the third Vitruvian idea) as perspective, resulted from a misreading of *sciographia* as *scenographia* in the original text, whose application was important only in the building of stage-sets. Thus he concludes that perspective, however important, was mainly recommended for painters and stage-set designers.

It is worthwhile to follow Barbaro's commentary in some detail in order to understand its implications. *Sciagraphy* or *sciography* derives etymologically from the Greek *skia* (shadow) and *graphou* (to describe). Scamozzi's villa comes immediately to mind. The etymology also speaks to the eventual relationship between the projection of shadows and linear perspective, an obligatory chapter in most seventeenth- and eighteenth-century treatises on the subject. In the architectural tradition, however, *sciagraphy* kept its meaning as a 'draught of a building, cut in its length and breadth, to display the interior', in other words, the profile, or section. This use of the term was still present in the nineteenth century (*Encyclopedia of Architecture*, London: The Caxton Press, 1852). Modern Latin dictionaries translate *scaenographia* (the actual term as it appears in the first existing Vitruvian manuscript) as the drawing of buildings in perspective, and generally assume that this word is synonymous to *sciographia*. The fact is that perspective was unknown in ancient Rome and even when Vitruvius speaks about the three types of stage-sets appropriate to tragedy, comedy and satire (Book V, ch. 6), there is no mention of perspective in connection with classical theatre. Vitruvius describes the fixed *scaena* as a royal palace facade with *periaktoi*, 'triangular pieces of machinery which revolve', placed beyond the doors, and whose three faces were decorated to correspond to each dramatic genre.

Barbaro argues that *scenographia*, which is 'related to the use of perspective', is the design of stages for the three dramatic genres. Appropriate types of buildings must be shown diminishing in size and receding to the horizon. He does not agree with 'those that wish to understand perspective (*perspettiva*) as one of the ideas that generate architectural design (*dispositione*)', ascribing to it the definition Vitruvius had given to *sciographia*. In his opinion it is plain that 'just as animals belong by nature to a

certain species', the *idea* that belongs with plan (*ichnographia*) and elevation (*orthographia*), is the section (*profilo*), similar to the other two 'ideas' that constitute architectural order (*dispositione*). In Vitruvius's conception, the section 'allows for a greater knowledge of the quality and measurement of building, helps with the control of costs and the determination of the thickness of walls', etc. Barbaro, in fact, assumes that in antiquity 'perspective' was only applied to the painted representations on the sides of the *periaktoi*.

It was only during the seventeenth century that perspective became a generative *idea* in architecture, in the Vitruvian sense of the category. Both theology and science contributed to this shift. Within the Jesuit tradition, Juan Bautista Villalpando homologised perspective with plan and elevation in his exegetical work on Ezekiel's vision for the Temple of Jerusalem. Emphasising the notion that the human architect must share the divine architect's capacity for *visualising* a future building, he insists that plans and elevations are similar to perspectives, as they are merely 'pictures' of a building-to-come. The inception of the Cartesian modern world and the epistemological revolution brought about by modern science, introduced during the Baroque period a conflict between symbolic and mechanistic views of the world. A world of fixed essences and mathematical laws deployed in a homogeneous, geometrised space, much like the Platonic model of the heavens, was assumed by Galileo to be the truth of our experience of the physical world. As an example, Galileo believed, after postulating his law of inertia, that the essence of an object was not altered by motion. This notion, now an obvious 'truth' (as long as we keep making abstractions from contexts), was at odds with the traditional Aristotelian experience of the world in which perception, with its double horizon of mortal embodied consciousness and a finite world of qualitative places, was accepted as the primary and legitimate access to reality. The new scientific conception eventually led to a scepticism regarding the physical presence of the external world. In the terms of Descartes, man became a subject (a thinking, rather than an embodied *self*), confronting the world as *res extensa*, as an extension of his thinking ego. This dualistic conception of reality made it possible for perspective to become a model of human knowledge, a legitimate and scientific representation of the infinite world.

Baroque perspective in art and architecture, however, was a symbolic configuration, one that allowed reality to keep the qualities that it had always possessed in an Aristotelian world. During the seventeenth century, the primacy of perception as the foundation of truth was hardly affected by the implications of this new science and philosophy. Perspective, now a legitimate architectural *idea*, became a privileged form of symbolisation. The architecture of the Jesuit churches by Andrea Pozzo, for example, can hardly be reduced to their section or elevation. Pozzo's frescoes are inextricably tied to the three-dimensionality of the architectural space, revealing transcendental truth in the human world. Rather than remaining in the two-dimensional field of representation, the perspective is projected from a precise point situated in lived space and fixed permanently on the pavement of the nave. The possibility of 'real order' for mortal existence appears only at the precise

moment that a human presence occupies the station point of the 'illusionistic' *quadratura fresco*.

Even though the theory of perspective, as an offspring of the new science, allowed human beings to control and dominate the physical reality of existence, the arts, gardening and architecture during the seventeenth century were still concerned with the revelation of a transcendently ordered cosmos. Thus it can be argued that by geometrising the world, humanity first gained access to a new transcendental truth. Even though perspective became increasingly integrated with architecture, perspectival systematisation remained restricted to the creation of an *illusion*, qualitatively distinct from the constructed reality of the world. Perspective marked the moment of an epiphany, the revelation of meaning and the God-given geometric order of the world. For a brief time, illusion was the locus of ritual. The revelation of order occurred at the precarious moment of coincidence between the vanishing point and the position of the observer.

While most seventeenth-century philosophers were still striving to formulate the appropriate articulation of the relation between the world of appearances and the 'absolute' truth of modern science, the work of Gérard Desargues appeared as an anomaly. Desargues disregarded the transcendental dimension of geometry and the symbolic power of geometrical operations. He ignored the symbolic implications of infinity and thus transformed it into a 'material' reality. He sought to establish a general geometric science, one that might effectively become the basis for such diverse technical operations as perspective drawing, stone and wood-cutting for construction, and the design of solar clocks. Until then, theories of perspective always associated the point of convergence of parallel lines with the apex of the cone of vision projected on the horizon line. Desargues was apparently the first writer in the history of perspective to postulate *a point at infinity*. He maintained that all lines in our ever-changing, mortal and limited world actually converged toward a real point, at an infinite distance, yet present at hand for human control and manipulation. Thus any system of parallel lines, or any specific geometrical figure, could be conceived as a variation of a single universal system of concurrent lines. Orthogonal projection as we understand it today was already for Desargues a simple case of perspective projection where the projective point was located at an infinite distance from the plane of projection. Desargues's method allowed for the representation of complex volumes before construction, implementing an operation of deductive logic where vision, perception and experience were supposed to be practically irrelevant. Perspective became the basic (and paradigmatic) prescriptive science, a new kind of theory prophetic of the epistemological shift that would take place during the nineteenth century, whose sole *raison d'être* was to control human action, the *practice* of applied sciences and our enframed technological world. The scientific revolution had witnessed in Desargues's system the first attempt to endow representation with an objective autonomy. Nevertheless, the prevailing philosophical connotations of infinity, always associated with theological questions, as well as the resistance of traditionally minded painters, craftsmen and architects, made his system unacceptable to his contemporaries. Desargues's basic aims would

eventually be fulfilled by Gaspard Monge's descriptive geometry near the end of the eighteenth century.

Despite European culture's reticence to demystify infinity, perspective soon ceased to be regarded as a preferred vehicle for transforming the world into a meaningful human order. Instead, it became a simple re-presentation of reality, a sort of empirical verification of the external world for human vision. Pozzo's treatise, *Rules and Examples of Perspective Proper for Painters and Architects* (Rome: 1693, English trans. London: 1700), occupies an interesting, perhaps paradoxical, position as a work of transition. From a plan and an elevation, his method of projection is a step-by-step set of instructions for perspective drawing that establishes the homology of projections and an absolutely fixed proportional relationship of orthogonal elements seen in perspective. Pozzo avoids the geometrical theory of perspective, and his theoretical discourse amounts to a collection of extremely simple rules and detailed examples of perspective constructions, perhaps the first truly applicable manual on perspective in the sense familiar to us. The consequential homology of 'lived' space and the geometric space of perspectival representation encouraged the architect to assume that the projection was capable of truly depicting a proposed architectural creation and, therefore, to 'design in perspective'. The qualitative spatiality of our existence was now identical to the objectified space of perspective, and architecture could be rendered as a picture. *

In the eighteenth century, artists, scientists and philosophers lost interest in the theory of perspective. Building practice, in fact, changed very little despite the potential of the new conceptual tools to transform architectural processes. The geometrisation of knowledge initiated with the inception of modern science in the seventeenth century was arrested by the focus on empirical theories spurred by Newton's work and by the identification of the inherent limitations of Euclidean geometry.

In this context, architects seemed nevertheless ready to accept the notion that there was no conceptual distinction between a stage-set constructed following the method *per angolo* of Galli-Bibiena, one where there was no longer a privileged point of view, and the permanent tectonic reality of their craft. Each and every individual spectator occupied an equivalent place in a world transformed into a two-point perspective. Reality was transformed into a universe of representation. The Baroque illusion became a potential delusion in the Rococo church. Even the vanishing point of the frescoes became inaccessible to the spectator, the new aesthetic chasm now to be bridged by an act of faith, while the building appeared as a highly rhetorical, self-referential theatre, one where the traditional religious rituals were no longer unquestionable vehicles for existential orientation. Humanity's *participation* in the symbolic (and divine) order of the world was starting to become a matter of self-conscious faith, rather than self-evident embodied knowledge, despite the pervasive (and unquestionably influential) Masonic affirmation of the coincidence between revealed and scientific truths.

Only after the nineteenth century and a systematisation of drawing methods could the process of translation between drawing and building become fully

* * transparent and reduced to an equation. The key transformation in the history of architectural drawing was the inception of descriptive geometry as the paradigmatic discipline for the builder, whether architect or engineer. The École Polytechnique in Paris, founded after the French Revolution, trained the new professional class of eminent scientists and engineers of the nineteenth century. Descriptive geometry, the fundamental core subject, allowed for the first time a systematic reduction of three-dimensional objects to two dimensions, making the control and precision demanded by the Industrial Revolution possible. Perspective became an 'invisible hinge' among projections. It is no exaggeration to state that without this conceptual tool our technological world could not have come into existence. With Durand's *Mécanisme de la composition* and its step-by-step instructions, the codification of architectural history into types and styles, the use of the grid and axes, transparent paper, and precise decimal measurements allowed for planning and cost estimates. Descriptive geometry became the 'assumption' behind all modern architectural endeavours, ranging from the often superficially artistic drawings of the École de Beaux Arts to the functional projects of the Bauhaus. The rendering of drawings in the Beaux Arts tradition does not change the essence of the architecture it represents, nor does it succeed in formulating an alternative to the architecture of the École Polytechnique. The Beaux Arts does not retrieve myth through drawings, but rather only formalises appearances with a status of contingent 'ornament', in a similar way to 'post-modern classical' styles. This is indeed at odds with the possibility of retrieving meaning through a phenomenological understanding of symbolisation.

In this context, it is easy to understand that true *axonometry* could only emerge as a preferred architectural tool after Durand, who was already suspicious of perspective and what he believes are deceiving painterly techniques. Conversely, 'new' theories of perspective became concerned with depicting 'retinal' images, such as curved or three-point perspectives. Despite similarities, it is in the early nineteenth century and not in the work of Pozzo, that the tools taken for granted by twentieth-century architects see their inception.

* Today the growing obsession with productivity and rationalisation has transformed the process of maturation from the idea to the built work into a systematic representation that leaves little place for the invisible to emerge from the process of translation. Computer graphics, with its seductive manipulation of viewpoints and delusions of three-dimensionality, are mostly a more sophisticated 'mechanism of composition'. The question concerning the application of computers to architecture is, of course, hotly debated and as yet unresolved. The instrument is not, simply, the equivalent of a pencil or a chisel that could easily allow one to transcend reduction. It is the culmination of the objectifying mentality of modernity and it is, therefore, inherently perspectival, in precisely the sense that we have described in this chapter. Computer graphics tend to be just a much quicker and more facile tool that relies on mathematical projection, a basic tool of industrial production. The tyranny of computer graphics is even more systematic than any other tool of representation in its rigorous establishment of a homogeneous space and its inability to combine different

structures of reference. It is, of course, conceivable that the machine would transcend its binary logic and become a tool for a poetic disclosure in the realm of architecture. The issue, perhaps the hope, in our post-historical, post-literate culture, is to avoid delusion through electronic media and simulation, the pitfalls of further reductive, non-participatory representation. Conceivably, as a tool of representation, the computer may have the potential to head towards absolute fluidity or towards further fixation and reduction. The latter is the unfortunate result of the implementation of the technological will to power, i.e. control and domination. The fact is that the results of computer applications in architecture, whether merely graphic, or more recently motivated by a desire to extrapolate 'complex natural orders' to practice, remain generally disappointing.

While descriptive geometry attempted a precise coincidence between the representation and the object, modern art remained fascinated by the enigmatic distance between the reality of the world and its projection. This fascination, with immediate roots in nineteenth-century photography and in optical apparatuses such as the stereoscope, responded to the failure of a modern scientific mentality to acknowledge the unnameable dimension of representation, a poetic wholeness that can be recognised and yet is impossible to reduce to the discursive *logos* of science, while it no longer refers to an intersubjective cosmological picture. Artists since Piranesi and Ingres have explored that distance, the 'delay', or 'fourth dimension' in Marcel Duchamp's terms, between reality and the appearance of the world. Defying reductionist assumptions without rejecting the modern power of abstraction, certain twentieth-century architects, including Le Corbusier, Alvar Aalto, Antoni Gaudí or John Hejduk, have used projections not as technical manipulations, but to discover something at once original and recognisable. These well-known architects have engaged the dark space 'between' dimensions in a work that privileges the *process* and is confident of the ability of the architect to 'discover', through embodied work, significant tactics for the production of a compassionate architecture. This emerging 'architecture of resistance', a verb more often than a noun, celebrates dreams and the imagination without forgetting that it is made for the Other, and aims at revealing depth not as homologous to breadth and height (3-D), but as a significant *first dimension* that remains mysterious and reminds us of our luminous opacity as mortals in a wondrous more-than-human world.