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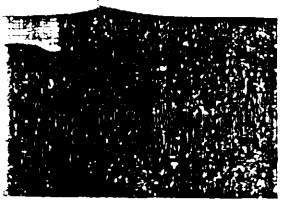
LIMITED SITES

> The secret of form lies in the fact that it is boundary: it is the thing itself and at the same time the cessation of the thing, the circumscribed territory in which the Being and the No-longer-being of the thing are one and the same.
>
> G. Simmel, "Metaphysics of Death," *Essays*

The existence of a defined building site is always taken for granted in contemporary architectural design, yet attempts to understand the reasons underlying its definition are surprisingly rare. Many designers see no need to actually visit the sites for which their designs are intended; graphic documents are believed to suffice for design development, although they restrict comprehension to outline definition. Sometimes, in fact, the site is changed during the course of the project without affecting the design, as was the site of Stirling's History Faculty at Cambridge University. Furthermore, many large architectural firms design buildings for clients whose international interests and properties preclude identification of any particular site; designs for wealthy worldwide hotel corporations are well-known cases in point. The real site of these designs is the drawings cabinet or computer file – a bureaucratic or electronic locus. Few architects ever question what all take for granted, that there is a defined perimeter within which the building to be designed will have its place. My question concerns how such a perimeter is commonly understood and the adequacy of this understanding.

In contemporary practice the site is generally known best and most productively in the form of a graphic two-dimensional scaled reduction, a "site plan." Knowledge of a given place as a site plan, however, does not support the designer's comprehension of the underlying reasons for its definition. Because of our dependence on site plans and other similar spatial abstractions as adequate symbols of the full reality of place, we have largely missed the creative aspect of site definition and the architect's responsibility to "invent" the site of any design project.

The question concerning the identity and limits of the site can be raised in review and criticism of three common conceptions of the site: as a *division of space*, as an *opening in a context*, and as a *parcel of land*.



Chapter I

THE SPACE

ABSTRACT SPACE

As all plans have dimensional and linear definition, the site plan is generally taken to propose a division of space. No matter what size or shape, all sites result from such division. Under this assumption space is thought to be a container so great that it has no limits at all. Infinite and therefore opposite anything definite – such as a site, which is, by its very nature, limited – space extends so far as to include all actual sites, and more, even all possible sites. Unlimited space has no specific presence because the definition of something signifies its boundary and identity; space has neither. Lacking limits and specific presence, space can be referred to as a container only metaphorically, because the relationship between container and contained can only exist between two limited things. Instead, space can be known only after a process of abstraction that reduces the characteristics of particular places to their most simple spatial quality – extension. To consider space truly one must, as Sir Isaac Newton wrote, "abstract from our senses, and consider things themselves, distinct from what are only sensible measures of them."[1] Space is a mental construct each person builds up and projects into or onto the natural world; it is an artifact, but less like an art object than a tool, one that is meant to be useful to architects, as well as surveyors and cartographers, insofar as they, too, presume a geometric field as the grounds for their measurements and constructions. Abstract space is a conceptual symbolism of site that serves instrumental interests.

The nature of abstract space in architecture is apparent in the normal techniques and instruments of current design practice. To a designer beginning work, a piece of transparent film or clean white sheet of paper newly taped down on the drawing board is the "space of design," an epiphany of the unlimited spatial framework for site definition. Such a base is pure pos-

sibility approximating complete absence, a mere but sufficient material precondition that tolerates any marks an architect wants to make. Unlike space, the sheet or film has dimensions and edges, but its edges are not determined as the limits of a built site would be, for the sheet can be conceived as an arbitrary strip from an infinite roll. The T square or parallel edge and the adjustable angle are instruments that frame the possible linear definition of any limited measure "within" such a site. Once executed, the drawn site plan is a measure of the space of the sheet, all but one possibility excluded. In the drawing, measures that are analogous to those of a parcel of land are represented in scaled reduction and aligned with one another to form the site "contained" in space. Perfect consistency throughout its unlimited extent is an equally striking characteristic of space as it is generally conceived; it is homogeneous, undifferentiated, and isotropic. Places identified within space as dimensioned shapes in plan are defined only provisionally or occasionally because all positions or areas are theoretically interchangeable. The practice of forming geometric equations demonstrates this. Yet the equality of measures and shapes in space is not necessarily an equality of quantities, but rather an equality of kind: the provisional limits of an area defined in space isolate nothing more than a specific metric quantity of something common to all – extension. Quantity of extension defines place identity, for any site in space is so many square feet or meters: position and direction, for example, are not necessary properties. Fixity of position in plan derives from other interests: the ease or efficiency of drawing production and the ease or clarity of comprehension. I have noted already that drawing instruments frame the linear definition of any limited measure or shape.

This general notion of space is commonplace in both professional practice and contemporary "theoretical projects"; professionals uncritically accept the "given" boundaries of a piece of land, and theory illustrators take for granted the edges of the drawing surface they have selected. With respect to site definition, there is no essential difference between these two sorts of production because both are grounded in the modernist idea of space I have outlined. The historical development of this idea is complicated by excessive polemic, but it can be understood as it bears on and clarifies current assumptions when the questions that provoked its formulation are examined.

OPEN SPACE

Theo van Doesburg, in his 1924 essay "Towards a Plastic Architecture," discussed the space of the new architecture under the headings of "the ground plan" and "anti-cubic" architecture.[2] He announced that the new architecture had opened the walls of the building and thereby eliminated

any separation between inside and outside, allowing the one to pass over into the other and a new openness to emerge. Frank Lloyd Wright described this as "breaking the box."[3] This "new openness" was the *structure of space*. In space, van Doesburg observed, "height, breadth, and depth plus time gain an entirely new plastic expression . . . architecture achieves a more or less floating aspect . . . which operates, as it were, in opposition to natural gravity."[4] Old (beaux arts) techniques of layout and composition had lost their place; symmetry, for example, what van Doesburg referred to as "equality between halves," had no place in a framework where compositions could "float" and turn side to side; front and back, like both left and right and top and bottom, became factors of equal value. Similarly, neither the position nor the direction of a composition could be fixed. When van Doesburg called for an end to "frontalism," he hoped that the facade as a place of primary orientation would be eliminated as a topic of composition. This would clear the confusion over (historical) styles – by eliminating the topic – and result in the articulation of "modern" space. In space there would be an all-sided development. The task of the modern architect was to master three-dimensional space through correctly relating arrangements of "space-cells"; all sides would have to be under consideration simultaneously.[5]

Van Doesburg exemplified this concept of space in a series of models and drawings he made together with C. van Eesteren. Wright "broke the box" by removing the corners. In de Stijl projects there was an elimination of facades (especially the front one) by the multiplication of corners horizontally and vertically. In some designs corners were elevated above the lowest horizontal, what had been understood historically as the ground level; in others corners were cut before they reached the top (the roof line); and toward the center corners were misaligned, so that no plane (wall) could be continuous across any one side of the composition: hence, no more frontalism. The most striking consequence of eliminating continuous exterior edges, both vertically and horizontally, was that the limits of the plan were made indefinite. It is impossible to determine at what height a "horizontal section" showing the "ground level" would be cut. Nor is it clear which vertical planes would subdivide "the space" of a "ground plan." Compositions of this sort have no base nor final limits; their perimeters allow openness and spatial continuity. Thus, the site of the plan is an indefinite division of unlimited space. Because there are no final limits every wall is another *partition*, and every distance is intermediate, an *interval* in the continuous expanse.

These compositions appear to have been conceived and drawn in axonometric projection. Van Doesburg insisted often that the architect who was to work with "plastic expression" must see all dimensions at once, and he

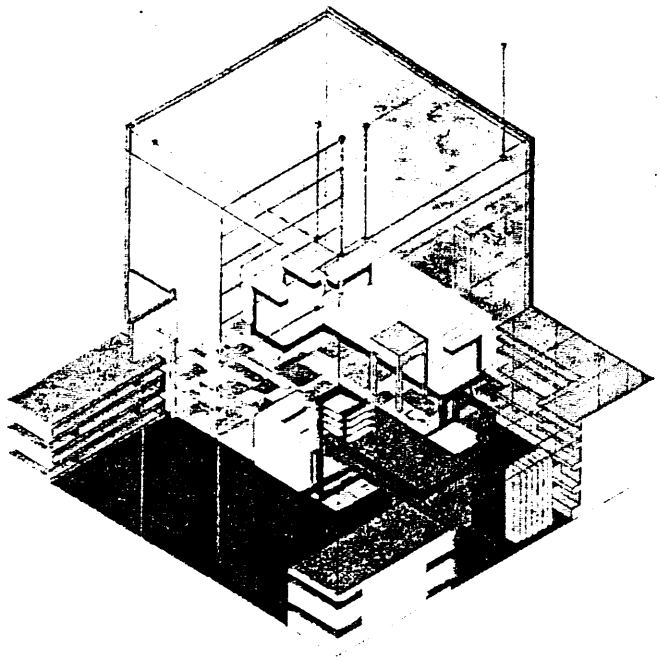


Figure 1. Project for Gropius's Office in Bauhaus, Weimar, 1923. Drawing by Herbert Bayer. Courtesy Bauhaus Archive, Berlin.

wrote often, if unclearly, about the fourth dimension. Every axonometric projection presents at least three sides of an object, and if neither shading nor color is used, that is, if the drawing consists of outline and contour only, the inner sides and spaces in the depth of the construction can be seen together, overlapped in transparency. Axonometric projection presents several different aspects of a composition simultaneously. Because it conceals less, it is the method of projection that opens enclosures and overcomes limits most efficiently. It also removes the composition from the horizon of perspectival experience, which confers frontality on whatever (object or person) reciprocates the "frontalism" of one's own body.

Van Doesburg and van Eesteren's models and drawings caused a great stir when they were first exhibited. Van Doesburg claimed that one effect of this exhibition was his influence on the drawing instruction at the Bauhaus. But already in 1923 Herbert Bayer had executed his well-known axonometric drawing of Walter Gropius's office at the Bauhaus in Weimar (Fig. 1).[6] In this drawing the use of color is limited to the definition of the lower horizontal planes, effectively establishing a ground or base of projec-

tion. With color omitted from the top and sides, both the outer limits of the space and its inner compartments are visible simultaneously. There is no privileged point of view, as in perspective representation, and no frontal figure positions the viewer on a perpendicular line of decreasing proximity; instead, depth equals width and height, and lines "within" the space run parallel to its central axes and extend in front of and behind one another. From this subdivision of space results great optical freedom and equivalence of viewpoints. It is as if aerial has been combined with interior perspective – making viewing ubiquitous. This is the cause of the essential reversibility and ambiguity of axonometric projection. Specificity of use and definition of enclosure exist secondarily in this "room," as a result of the arrangement of objectlike or free-standing furnishings, which confer scale, frontality, level, and location by virtue of their necessary correspondence with the human body and the spatial order it confers.

COORDINATE SPACE

Accuracy of objective measure is another characteristic of axonometric drawing and the concept of space it represents. Earlier draftsmen were attracted to the technique for this reason. Its use can be traced through seventeenth- and eighteenth-century writings on fortification and eighteenth- and nineteenth-century writings on the design and depiction of machinery and joinery, where precision was chiefly important. August Choisy, engineer, historian, and professor at the Ecole polytechnique, was the most well known exponent of axonometric drawing in the decades before van Doesburg's writings and drawings. His "frog's eye" projections of buildings and details (Fig. 2) in *L'art de bâtir chez les Romains* of 1873[7] demonstrate the measured accuracy of axonometric projection and, surprisingly, van Doesburg's estimation of the "equal value" of all sides. The view from below anticipated the twentieth-century "antifrontalism," although Choisy's drawings were descriptive and explanatory, not works of design composition.

The coordinates of Choisy's axonometric composition are also important to observe. They are drawn light, and appear to represent the basis of layout procedure. Construction lines appeared at the origin of the drawing and set the framework for its basic articulation, a pattern of parallels and perpendiculars. Choisy did not write at length about axes and their importance in drawing and design, perhaps because their use had already become commonplace in architectural instruction at the Ecole polytechnique during his professorship and the Ecole des beaux arts at the same time. Julian Guadet, in *Eléments et théorie de l'architecture*, the last and most comprehensive summary of teaching at the Ecole des beaux arts, wrote that axes such as those drawn by Choisy and countless other architects of the time were the

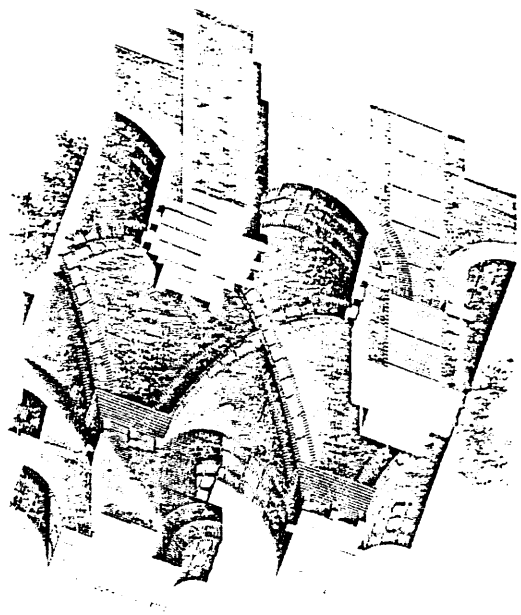


Figure 2. "Palatin," August Choisy, *L'art de bâtir chez les Romains*, plate 8, 1873. Courtesy of the Perkins Library, University of Pennsylvania.

"key of design" ("L'axe est la clef du dessin et sera celle de la composition" – The axis is the key of design and that of composition).[8] Guadet, however, did not advise the execution of axonometric projection in architectural design. This raises a question as to the relationship between axes of projection and axes of composition in coordinate space. They are not the same; yet with the use of both, the construction of space is fixed or spatial, and architectural identity is determined at its "place" of origin only, any point of linear crossing, leaving its "perimeter" extension unlimited. When seen as instruments of spatial division, axes of axonometric projection and plan composition have in common their indefinite ends.

In the chapter entitled "Des instruments de dessin et leur emploi" Guadet pointed out that the idea of axes in architecture is far more extended than the idea of coordinate axes in geometry, which is, nevertheless, its source.[9] Although the central axis of a bank plan bisects its outline, it is also the baseline of a vertical midplane that forms the central axis of the whole monument, of its vaults, lights, windows, and even principal and rear facades. The plane thus substitutes for the true central axis of the space of the monument, which would be more like a central axle than an axial plane. The longitudinal section is also an extension of this projected framework.

Lines parallel to the central axis, through the side doors and passageways, are also axes, as are those perpendicular to the central axis. Guadet often referred to the axis that is central and perpendicular to the front facade as the principal one, meaning, it seems, the initial line, which is an instrumental designation. This designation was necessary when axes were multiplied on plan, especially when the principal axis was used as the first line of a composition of parallels and perpendiculars. There is, however, no indication of a device for establishing the limits or endpoints of the parallels and perpendiculars within this technique of composition since every line projected in this way is really a ray in two directions. Axes extend beyond their perpendiculars into the space of the drawing and likewise of the site. Nor is there any limit on their repetition in the formation of subordinate modules, bays, or even wings. Working with axes does not provide the designer with the necessary limits of the site, only the means for extension and subdivision, nor does this method improve the designer's comprehension of whatever limits are given on the site.

The instrumental role of principal axes and their unlimited extent can be seen in a very informative drawing published by Jean Louis Nicolas Durand in his *Précis des leçons d'architecture* of 1819.[10] His plate 21, "Marche a'suivre dans la composition d'un projet quelconque" (Fig. 3), shows designers how to proceed in the production of a design beginning with axes and a simple distribution of volumes. Assuming the building program is given, the designer's first step is to conceptually separate the building's uses from one another and then determine the number of the building's necessary parts (the several masses and courts that compose the whole).[11] Once this is done the parts of the program are to be ranked as primary or secondary so that possible and appropriate locations for each can be determined. This procedure would be part of what is called "programming" nowadays, since it precedes graphic work. With the drawing of axes, design begins, as they "fix the idea" of the arrangement.[12] Sketching axes also aids the memory of the designer, assists the development of the design, and later facilitates exact definition.

The graphic process begins by marking the center, at once the center of the principal room and the crossing of the two major axes. At equal distances from the center point, on the four axes, four points are established from which other perpendicular axes (secondary axes) are projected. This second set of lines is then used to center or outline other parts of the program. Axial lines run through the center of each room, court, passage, or doorway, and then the facades into the as yet undetermined space of the site. Earlier in the text, Durand suggests that the first two axes of the composition trace the central axes of the drawing paper, so that the centers of the composition and of the paper are the same.[13] These initial lines (*axes*

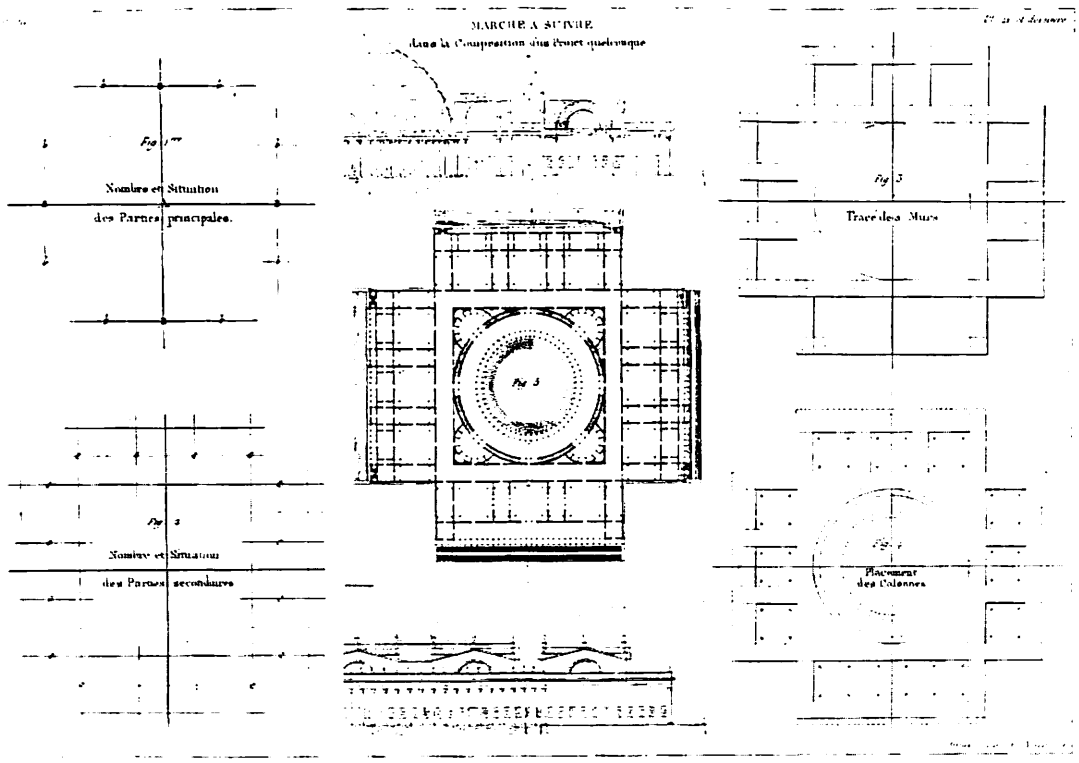


Figure 3. Marche a'suivre, Jean Louis Nicolas Durand, *Précis des leçons d'architecture*, plate 21, 1819. Courtesy of the Perkins Library, University of Pennsylvania.

primitifs) are also used to position the other necessary views on the same page, facade above and section below. He argues that in practice this method will produce correct and clear drawings while saving time and effort. Earlier I argued that the position of a site plan in the space of the sheet was determined by the ease or efficiency of drawing production and the ease or clarity of comprehension; certainly, such a composition exists nowhere other than the space of the white sheet.

In figure 2 of Durand's "Marche a'suivre" we can observe how the multiplication of parallels and perpendiculars (*entre axes*) produces a figure that approximates a grid. Every design approximates a grid because each "originates" from unlimited coordinate space, and the grid of composition is nothing more than an illustration of that space "before" a design is discovered "within" it. In the "Partie Graphique" of the *Précis*, Durand illustrates his lessons with a set of drawings that demonstrate how multiple axes can be used to control alignment, wall and column locations, roof structural

systems, room distribution, and plan types – all without the specification of either a site or a program. A module regulates the distance between each axis on the separate plans, but neither the module nor the resulting grid provides limits for the plan. Here, as before, composition lines are allowed to extend indefinitely, to "fade off" into the margins of the sheet. The location of their terminus is a very ambiguous architectural topic because they pose no relationship with anything outside of or off the sheet. Nothing exists outside the lines of the grid because everything exists within the space it represents. The modular arrangement of the axes is a graphic instrument that serves the efficient distribution of the parts of the composition in the space of the drawing. Durand's plans are the clearest illustrations of the fact that the articulation of a site as a division of space does not improve the designer's comprehension of the reasons for its own definition.

Measure and extension are abstract characteristics of any site, and while they can sustain the efficient and systematic execution of site plans, they can also prevent the designer from grasping any particular site's concrete qualities. In abstract space all sites are identical in kind as measures of extension and possess no uniqueness of position or orientation. The designs of van Doesburg, Guadet, and Durand I have considered are not sited anywhere in particular, as is true for all those produced in our time that see the site as a division of space.

NOTES

1. Sir Isaac Newton, *The Mathematical Principles of Natural Philosophy*, vol. 1, p. 9. See also, for commentary and interpretation, A. Koyré, *From the Closed World to the Infinite Universe*, chap. 9; A. Koyré, *Newtonian Studies*, chap. 2; E. A. Burtt, *The Metaphysical Foundations of Modern Science*, chap. 7, sects. 4 and 6; and M. Jammer, *Concepts of Space*, chap. 4.
2. T. van Doesburg, "Towards a Plastic Architecture," 1924, in U. Conrads, *Programs and Manifestoes on Twentieth Century Architecture*, pp. 78–80.
3. F. L. Wright, *An American Architecture*, p. 75. On p. 77 he wrote, "In this simple change of thought [the corner window] lies the essential of architectural change from the box to free plan and the new reality that is space instead of matter."
4. Van Doesburg, "Towards a Plastic Architecture," p. 179.
5. T. van Doesburg, "The New Architecture and its Consequences," in J. Baljeu, *Theo Van Doesburg*, pp. 142–7, 189–198.
6. See Y.A. Bois, "Metamorphosis of Axonometry," *Daidalos*, vol. 1, 1981: 41–58, and B. Schneider, "Perspective Refers to the Viewer, Axonometry Refers to the Object," ibid., pp. 81–95.
7. A. Choisy, *L'Art de bâtir chez les Romains*.
8. J. Guadet, *Eléments et théorie de l'architecture*, vol. 1, p. 40.
9. Ibid.
10. J. L. Durand, *Précis des leçons d'architecture*.
11. Ibid., pp. 92.
12. Ibid., p. 93.
13. Ibid., p. 33.