ANTHONY VIDLER

Diagrams of Diagrams: Architectural Abstraction and Modern Representation

I

ITS SURFACE SEEMS SLICK, PERHAPS reflective, often translucent, skinlike, visually viscous; its form appears curved, ballooned, bulging, segmental, warped, and twisted; its structure looks webbed, ribbed, and vaulted; its materials might be synthetic, resinous, metallic, and alloyed; its interior would be cavelike, womblike, tunneled, burrowed, and furrowed; its furniture and fittings are envisaged as soft, almost porous in texture, cast or injected, molded, and sensitive to heat and light. Its architect calls it a "blob," and compares it to a history of similar objects in nature that cultural theory since Georges Bataille has identified with the *informe*. The techniques of its design are drawn not from architecture but from animation software that generates its complex forms with the help of digital avatars that work, independent of the architect, to produce multiple iterations of possible combinations.[1]

Or perhaps it resembles a smooth moon landscape seen as if from a low-flying aircraft moving fast, its rifts, folds, crevices, escarpments, faults, and plateaus swiftly zooming into view like the artificial terrain of a Star Wars Racer game; bundles of intersecting tubes and paths, vectors, and force fields are marked on its surface, as if the entire environment had been transformed into a vast fiber-optic network or a magnetic plate whose tectonics were distorted by huge densities of attraction and repulsion. What seem to be the traces of human settlement are layered and compressed like so many geological formations, congealed into a solid geometry of crystalline forms. Neither a map nor a model of an existing geography, this environment is a virtual model of data as if it were geography, inserted into the morphologically transformed structures of cities and regions. Its architects refer to topologies and topographies and prefer to identify what they do as mapping rather than drawing.[2]

Or maybe its edges are hard and sharp, its walls, if they can be identified, are transparent, or luminously translucent; its interiors are filled with semifloating, egg-

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like enclosures; its levels are marked in bands or zones that respond to similar zones in plan; like some three-dimensional coordinate system at the scale of a building, it codes these zones in color and material—a digital chip blown up extralarge—and intersects them with composite domains that automatically create neutral areas, mixed in use and ambiguous in form; its outer shapes are cubic or ovoid, mimicking in outline the advanced aesthetics of high modernism, simplifying for the sake of semiotics references to the abstractions of Le Corbusier or Ludwig Mies van der Rohe. Its architects speak of delirium as embedded in the apparently rational zoning schemes of modernism; they track movement and event in space like choreographers. Their projects and buildings share an ironic sensibility that prefers the arbitrary rigor of an imposed and consciously subverted system to any emotive expressionism. Their drawings are cool and hard-line, black and white diagrams of functional forms.[3]

Or, again, its roofs are clad in titanium or aluminum that turns gold, grey, and silver according to the light; they rise up in profusion like so many sails or shards; its forms are impacted and apparently randomly juxtaposed and intersected; its profiles are exuberant, like an expressionist utopia come to life, somewhere between the Cabinet of Doctor Caligari and a watercolor by Hermann Finsterlin; its intricate, lacelike structure creates a web of interstitial space, somewhat as if the Eiffel Tower had been chopped up and rewelded for its materials; its interiors are strangely mobile, flowing walls and undulating ceilings creating volumes of uncertain dimension. Its architects work with models cut out of brown cardboard, tearing them apart, sometimes scanning them digitally, always remodeling in an apparently interminable analysis of design *en abyme.* Their drawings are thin traceries of wire-frame construction, digital or not, that affirm process rather than product and refer to various traditions of the avant-garde, whether constructivist, dadaist, or surrealist.[4]

Such imaginary objects, composite portraits of contemporary architectural projects, exemplify only a few of the design tendencies that have superseded what in the last decades of the twentieth century was called postmodernism. In place of a nostalgic return to historical precedents, often couched in "renaissance humanist" rhetoric, these new "blobs," "topographies," and "late modernisms" find their polemical stance in a resolutely forward-looking approach and their modes of design and representation in digital technologies. Radically different in their forms and aims, they nevertheless find common cause in their espousal of the one representational technique that they share with their modernist avant-garde antecedents: their affection for what they and their critics call the "diagram."[5]

This tendency is exhibited on every level of meaning associated with the term *diagrammatic*, and runs the gamut of a wide range of approaches and styles that at first glance seem entirely disparate—from diagrammatic caricature to theoretical discourse, modernist revival to digital experiment. Thus, included under this rubric would be works as radically dissimilar as Dominique Perrault's new Bibliothèque

de France, with its cartoonlike towers in the shape of open books, and Jacques Herzog and Pierre de Meuron's renovation of Giles Gilbert Scott's 1949 Bankside Power Station as the Tate Modern in London, with its sophisticated minimalism and cool, stripped down, and vast interiors, lit by translucent panels and retaining the simple parallel volumes of the old turbine house and ancillary spaces. More theoretically oriented, Bernard Tschumi, whose early theoretical exercises in the 1970s diagrammed the intersection of movement in space as creating events according to a free adaptation of dance notation, developed a rigorous typology of red follies on a grid for the park of La Villette in Paris. Recently he elaborated the genre in the design center of Le Fresnoy, where a new roof level spans across the existing pavilions of the former factory, creating in a single "diagrammatic" gesture a rich complexity of spatial interaction. The urban projects of Rem Koolhaas, involving the physical planning of whole territories at a range of scales—"Small, Medium, Large, Extra Large," to take the title of his own monograph—move toward a model of architecture as a form of data, anticipating the digital constructs of a younger generation of Dutch architects; his houses, conceived as subtle and ironic transformations of modernist precedents might almost be seen as diagrams of diagrams.[6]

Supporting this revival of diagrams, an entire theoretical discourse has been developed around the genre, following the coining of the term *diagram architecture* by the Japanese architect Toyo Ito in 1996 to characterize what he saw as a new sensibility in the work of his compatriot Kajuyo Sejima (fig. 1).[7] The strength of Sejima's architecture, he noted, derived from her extreme reduction of the building to a special kind of diagram, constructing it as far as possible as she represented it. As he wrote, "You see a building as essentially the equivalent of the kind of spatial diagram used to describe the daily activities for which the building is intended in abstract form. At least it seems as if your objective is to get as close as possible to this condition."[8] In this ascription, architecture itself becomes joined to its diagram—a diagram of spatial function transformed transparently into built spatial function with hardly a hiccup. The wall, which technologically takes on all the weight of this translation, thus carries the freight of the line, or vice versa. Sejima herself has developed the genre into a design method of distinct clarity, where simple black and white diagrams of function and space are translated elegantly into building in a minimal aesthetic that goes well beyond the merely functional, in a way that has led some critics to see echoes of Japanese mysticism in the intensity of her material abstractions.[9]

From a less transcendental, and more neostructuralist position, Peter Eisenman, whose elegant linear projections of complicated cubic constructions, generated from a combination of historical analysis of modernism and a study of syntactical visual language that derived from his reading of structural linguistics, became the paradigm of what the 1970s termed "paper architecture," now finds a new intellectual receptivity for his diagrammatic drawings. His recently published *Diagram*

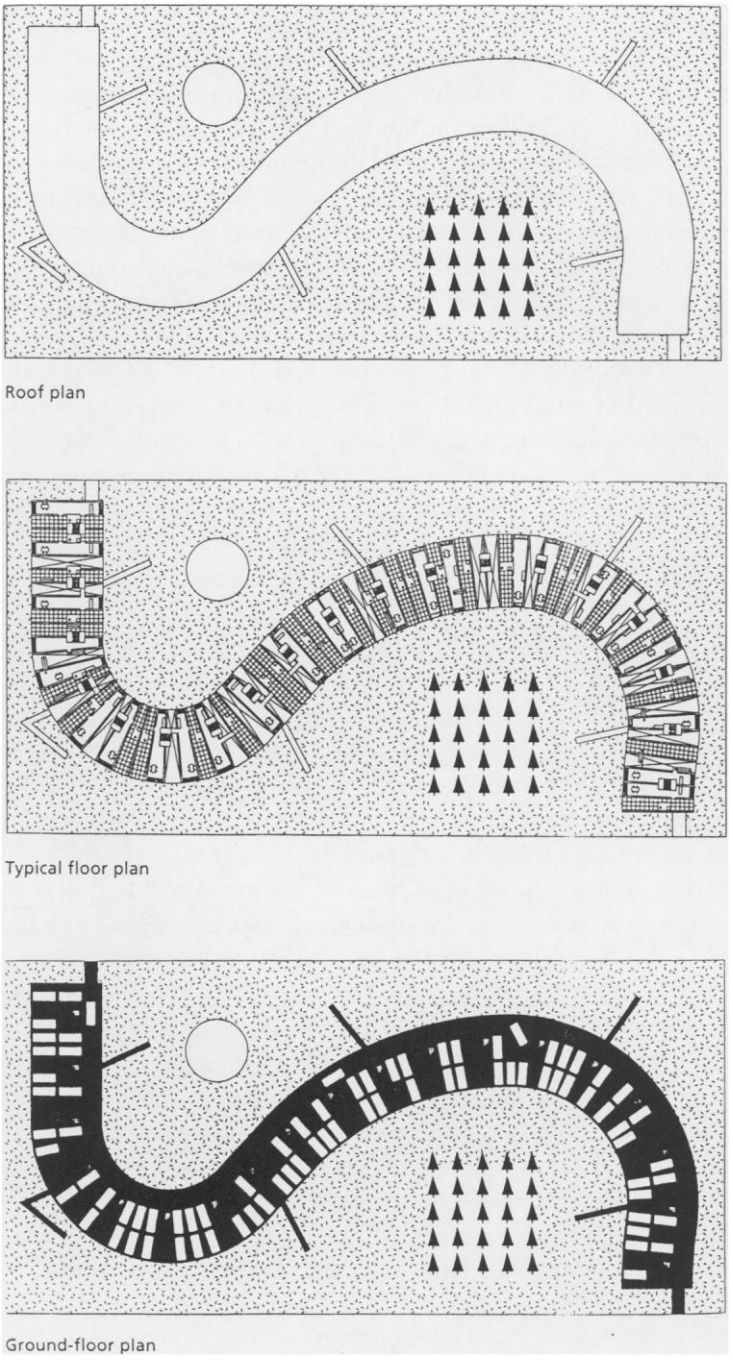

FIGURE 1. Kazuyo Sejima, Project for Middle Rise Housing Prototypes, 1995. Plans. *Assemblage* 30 (August 1996).

Diaries at once reframes his life's work under a term whose revived legitimacy offers a means of inventing a pedigree for his digital experiments in morphological projection (fig. 2).[10] These projects and many more continue the late-modern critical and ironic investigation of the modernist legacy of the last twenty years, while using the diagram as a device to both recall and supersede its formal canons. As Robert Somol notes in his introduction to *Diagram Diaries*, for the first time in the modern period, the diagram has become "the matter of architecture" itself, as opposed to its representation. "The diagram," he writes, "has seemingly emerged as the final tool, in both its millennial and desperate guises, for architectural production and

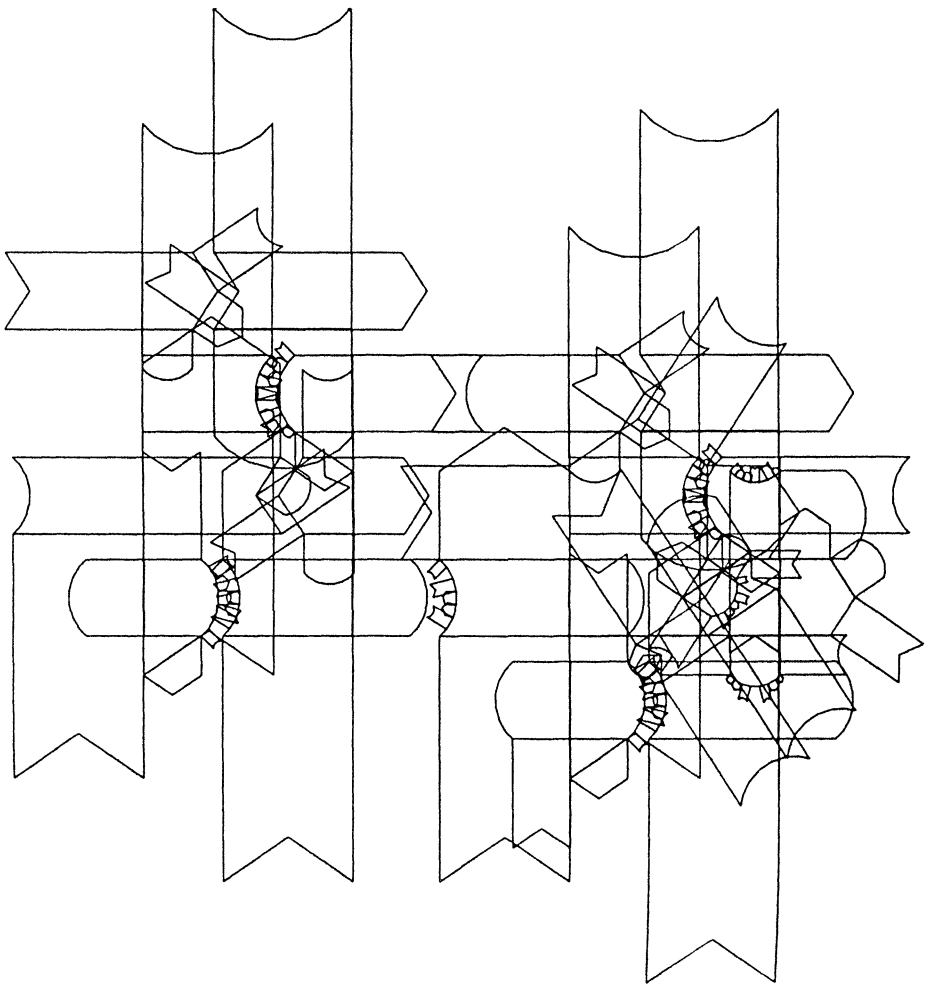

FIGURE 2. Peter Eisenman, Frankfurt Biocentrum, 1987, Diagram of Superpositions and Rotations, in *Diagram Diaries* (New York), 1999.

discourse."[11] Operating between form and word, space and language, the diagram is both constitutive and projective; it is performative rather than representational. In this way, it is, Somol concludes, a tool of the virtual rather than the real and a means of building (in both senses of the term) a virtual architecture, of proposing a world other than that which exists.

The diagrammatic turn in architecture, on another level, has been quickly assimilated into design practices that work with digital techniques of representation. Here the "virtual" qualities of the diagram pointed out by Somol take on new significance for a medium that is rapidly supplanting the hand-drawn diagram, sketch, or plan. Despite the resistance of many architects, who mourn the passing of the oft-claimed relations between eye and hand, the evident speed with which digitized images of traditional modes of representation (perspective, axonometric, plan, and so on) can be modified and worked with has for many years supported the introduction of so-called computer-aided design into practice.[12] But more significant still, what has clearly emerged in recent buildings and projects is an architecture itself not simply aided, but generated, by digital means, whether through animation, morphing, or three-dimensional scanning and milling, in a way that would have been formally and technologically impossible hitherto. The forms of this tendency range from the ecstatic expressionism of Frank Gehry, the topographical and regionalist mapping of new Dutch architects such as Ben van Berkel and Caroline Bos, or Winy Maas of MVRDV; the deconstructionist work of Hani Raschid; the new decorative and spatial orders of Donald Bates and Peter Dickenson of LAB Architects, Melbourne; and the explorations into the architectural *informe* by Greg Lynn and Karl Chu, whose animations and geometric permutations produce an almost neobaroque efflorescence of formal experiments fueled by software developed originally for the movie, aerospace, and auto industries. In projects like these, the translation of geometry into building is the more direct as a result of the intimate relations between digital representation and industrial production, so that, for example, all traditional ideas of standardization can be jettisoned by a cutting or milling factory that runs automatically from the designer's program, as was the case with the titanium panels, all of different dimensions, that surface the vaults of Bilbao. The digital effect of these schemes is further reinforced by the use of materials with smooth reflective or translucent surfaces and of complex structures before only imagined in expressionist or constructivist utopias.[13]

II

Architectural drawing has always been, as Walter Benjamin remarked, a "marginal case" with respect to the major arts.[14] In the sense that it precedes the building, that it is produced without reference to an already constituted object in the world, it has never conformed to traditional formulations of "imitation." In the

sense that it is a drawing toward the work of art itself, it is inevitably regarded as a supplement, part of the evolutionary narrative of a building's production, but not to be valued as art per se. As the late Robin Evans noted, this is "the peculiar disadvantage under which architects labor; never working directly with the object of their thought, always working at it through some intervening medium, almost always the drawing, while painters and sculptors, who might spend some time working on preliminary sketches and maquettes, all ended up working on the thing itself."[15] Yet it is true, as Evans also pointed out, that the architect's drawing, as opposed to the painter's and the sculptor's, is generally the only work actually touched by the architect's hand.[16] This paradoxical separation between the artist and the work, the foundation of much architectural theory concerned with representation, was the occasion for Benjamin's remark that architectural drawings could not be said to "*re*-produce architecture." Rather, he observed, "They *produce* it in the first place" ("Study of Art," 89).

Architectural drawing is also seriously "technical" in nature, representing its objects with geometrical projections, plans, and sections that demand a certain expertise of the viewer, one trained to imagine the characteristics and qualities of the spaces represented by these enigmatic lines, as well as interpret them in their context of a long tradition of spatial culture, cued to their often sly and concealed references to former architectural precedents. Even when the architect employs a perspective rendering, this is hardly ever a simple matter of illustration; the particular point of view, the distortion of foreshortening or extension, the medium itself, are more often than not brought into play to emphasize the architect's spatial idea, one that is supported by the position and scale of figures and furnishings, which in turn provide clues as to the kind of life, the nature of the everyday, envisaged as taking place in this space and that the space itself will somehow reinforce. The architect works in code, code that is readily understood by others in the trade, but is as potentially hermetic to the outsider as a musical score or a mathematical formula. These encodings of representation have, throughout the modern period, suffered from a second level of difficulty. At a time when architecture was tied to the classical conventions, or later to the historical styles, the amateur might easily enough recognize the period or genre, identify the cultural reference, and comprehend the implied commentary. Modern architectural drawings however, depict a more or less abstract object, assembled out of geometrical forms, with few recognizable building elements such as columns or decorative motifs. Abstractions of abstractions, they have increasingly over the last two centuries become little more than ciphers understood only by the professional circle around the architect, meaningless to client and layperson alike. Le Corbusier's schematic evocations of infinite space, his evocation of a building's principal elements in a few quick lines; Mies van der Rohe's perspectives, often signaled by the thinnest of pencil lines situating a plane hovering in universal, gridded, space; such drawings suspended somewhere between a design process and a diagram, carry little weight as popular representations.

This apparent identity of the modernist drawing and its object, both informed by a geometrical linearity that tends toward the diagrammatic, has, throughout the modern period, led to charges that the one is the result of the other, that architecture has too-slavishly followed the conventions of its own representation. Modern architecture, concerned to represent space and form abstractly, avoiding the decorative and constructional codes of historical architectures, is thus accused of reductivism, of geometrical sterility, and thence of alienation from the human. This has been true since Victor Hugo first launched the attack in the first era of architecture's mechanization, and the issue has periodically resurfaced over the last century to be reframed most succinctly in Henri Lefebvre's critique of modernism's "abstract space."[17] For Hugo, the culprit was a geometrically regulated neoclassicism; for Lefebvre, the enemy was enshrined in modernism itself. In both cases, the complaint had as much to do with architecture's chosen means of representation as with the built structures themselves. Hugo's complaint was that architecture, from the French Revolution on, had been transformed into a geometrical caricature of its former self, exemplified in the cubic masses of Claude-Nicolas Ledoux's tollgates built around Paris between 1785 and 1789 and confirmed by the powerful influence of the new graphic formulas of the Ecole polytechnique introduced after 1795. Henri Lefebvre's criticism of "abstract space" updated this critique to include the modernism of Le Corbusier. Both Hugo and Lefebvre ground their indictments on what they consider the root cause of the "fall" of architecture: representation, or more specifically, the too easy translation of the new graphic techniques used by the modern architect into built form. Architecture, that is, looked too much like the geometry with which it was designed and depicted. Geometry is thus seen as the underlying cause of architectural alienation, the degradation of humanism, and the split between architecture and its "public." And if for Hugo architecture had become no more than the caricature of geometry, for Lefebvre architectural blueprints, and more generally the architect's fetishization of graphic representations as the "real," sterilized and degraded lived space. For Lefebvre, the discourse of the graphic image "too easily becomes—as in the case of Le Corbusier—a moral discourse on straight lines, on right angles and straightness in general, combining a figurative appeal to nature (water, air, sunshine) with the worst kind of abstraction (plane geometry, modules, etc.)."[18]

Such criticisms have been commonplace throughout the life of modernism. "Diagrammatic architecture" has been a term more of abuse than praise, signifying an object without depth, cultural or physical, one subjected to the supposed tyranny of geometry and economy—the commonplace of the "modernist box" caricatured by postmodernists. As early as 1934, at the height of modernist functionalism, the art historian and friend of Le Corbusier Henri Focillon was warning that "in considering form as the graph of an activity . . . we are exposed to two dangers. The first is that of stripping it bare, of reducing it to a mere contour or diagram. . . . The second danger is that of separating the graph from the activity and of considering

the latter by itself alone. Although an earthquake exists independently of the seismograph, and barometric variations exist without any relation to the indicating needle, a work of art exists only insofar as it is form." "Form" for Focillon, as for many modern artists schooled in Adolf Hildebrand's idealist notions of form since the turn of the twentieth century, was to be rather envisaged in "all its fullness."[19] In this context, the diagram was to be avoided, a mechanical trap.

III

Despite such criticisms, the diagram has held a privileged place in the development of modern architecture as at once responding to the aesthetics of rationalism and the authority of functionalism. Beginning in the late eighteenth century, and in tune with the geometrical predilections of the scientific Enlightenment, a few architects began to turn away from the elaborate renderings, common to the late-eighteenth-century academy and its heir, the Ecole des beaux-arts. Ledoux, trained as an engraver and inspired by the plates of Denis Diderot's *Encyclopédie*, developed a geometrical style of representation that informed his built work. The architect Jean-Nicolas-Louis Durand, appointed to the newly established Ecole polytechnique after 1795 and responding to the demands of its new director, Gaspard Monge, developed a method for representation—a code of points, lines, and planes to be organized on the newly introduced graph paper—that in his terms corresponded to the stereotomy and metric standardization of Monge and the requirements of simplicity and economy (figs. 3 and 4).[20]

> Those who think that the aim of architecture is essentially to please the eyes, necessarily regard the rendering of geometrical drawings as inherent to architecture; but if architecture was in effect only an art of making images, at least these images should be true, and present objects as we see them in nature: but rendered drawings offer nothing geometrical to our eyes; consequently the rendering of geometrical drawings, far from adding to the effect or the intelligence of these drawings, can only make them cloudy and equivocal; which is by no means suitable to render them more useful, or even more capable to please. This kind of drawing should be the more severely banished from architecture, because not only is it false, but supremely dangerous. In whatever manner one considers this art, the projects the most suitable to produce the greatest effects in execution, are those which are disposed of in the simplest way.[21]

But for Durand, drawing was also a way of constructing what the philosophers had attempted to invent for centuries—a kind of universal characteristic: "Drawing serves to render account of ideas, whether one studies architecture or whether one composes projects for buildings, it serves to fix ideas, in such a way that one can examine anew at one's leisure, correct them if necessary; it serves, finally to communicate them afterwards, whether to clients, or different contractors who collaborate in the execution of buildings: one understands, after this, how important it is to familiarize oneself with it [drawing]."[22] In this sense,

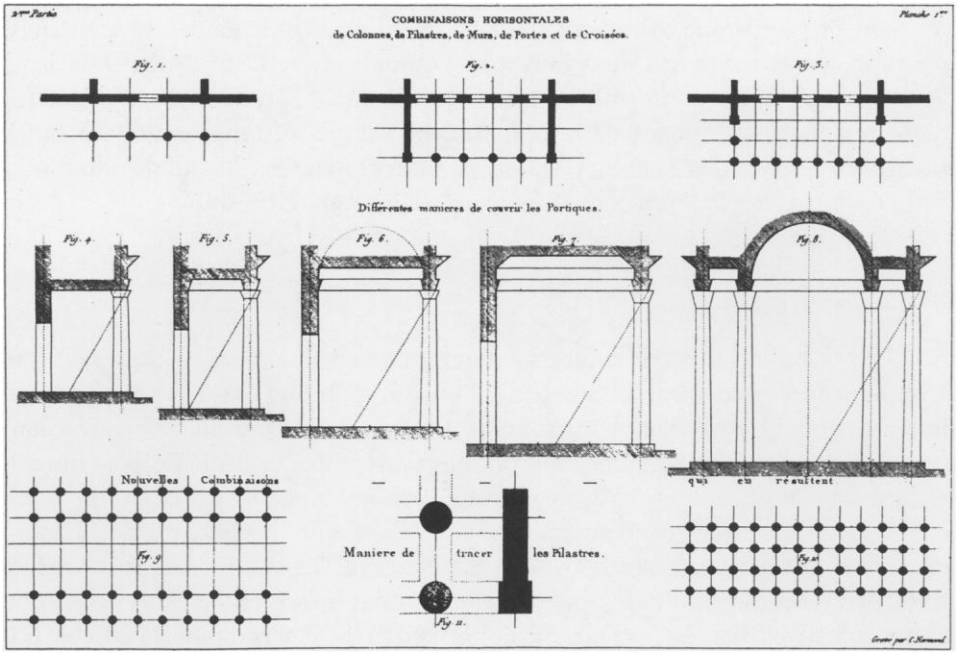

FIGURE 3. J.-N.-L. Durand, "Horizontal Combinations," in *Précis des leçons d'architecture* (Paris, 1819), 1: plate 1, part 2.

Drawing is the natural language of architecture; every language, to fulfill its object, should be perfectly in harmony with the ideas of which it is the expression; thus, architecture being essentially simple, enemy of all uselessness, of all difficulty, the genre of drawing that it uses should be free from every kind of difficulty, pretension, and luxury; then it will contribute significantly to the speed and ease of study and to the development of ideas; in the opposite case, it will only render the hand clumsy, the imagination, lazy, and often even the judgement very false.[23]

Durand's diagrammatic method, economic of time and resources, and readily communicable to the client, the engineer and the contractor, was widely adopted in the nineteenth century, although it did not, as its inventor had hoped, succeed in displacing the more elaborate renderings of the Beaux-arts. Modernists at the end of the century, however, were quick to seize on its potential for conveying abstraction and function, among them Le Corbusier, who seized on the axonometric projections of historical structures published by the engineer Auguste Choisy in 1899, reprinting them in his articles on architecture for *L'esprit nouveau* between 1920 and 1923.[24]

Inheriting this double ideal, of a graphic representation that is itself a tool for the installation of the utopia it outlines, a geometrically driven modernism developed a special affection for the utopian diagram. Ledoux's claims for the circle and

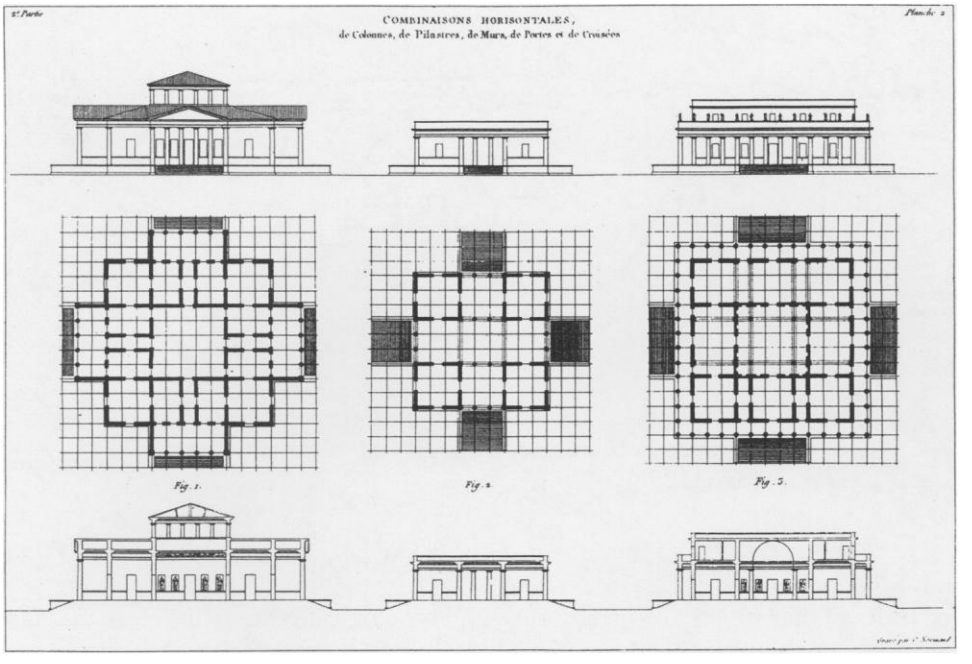

FIGURE 4. Durand, "Horizontal Combinations," 1: plate 2, part 2.

the square as the "letters" of the architect's "alphabet" echoed Enlightenment projects for the development of a universal language, and his Ideal City of Chaux demonstrated the use of such geometry as a pictogrammatic language of three-dimensional form for a Rousseauesque society on natural mores. Le Corbusier, with an architectural sensibility informed by postcubist developments in painting and sculpture, psychology and philosophy, found in "abstraction" a weapon against the historical styles and a powerful support for an architecture based on form (and its qualities of mass and surface) and space (and its qualities of enclosure or infiniteness). In this sense, abstraction was registered as a primary aesthetic quality, one that allowed for the proportional systems and historical styles formerly making up the aesthetic content of the "art" of architecture, to be superseded by its own constructive and space-enclosing elements expressed in the pure geometries now coincident with the technological potential of steel and reinforced concrete. "Architecture has nothing to do with the 'styles,' " wrote Le Corbusier in 1923. "It appeals to the highest faculties by its very abstraction. Architectural abstraction is both specific and magnificent in a way that, rooted in brute fact, it spiritualizes it. The brute fact is subject to the idea only through the order that is projected upon it (fig. 5)."[25]

The neo-Platonic echoes of this form of abstraction were clear, and Le Corbusier openly claimed continuity from earlier classicisms—from the formal and spa-

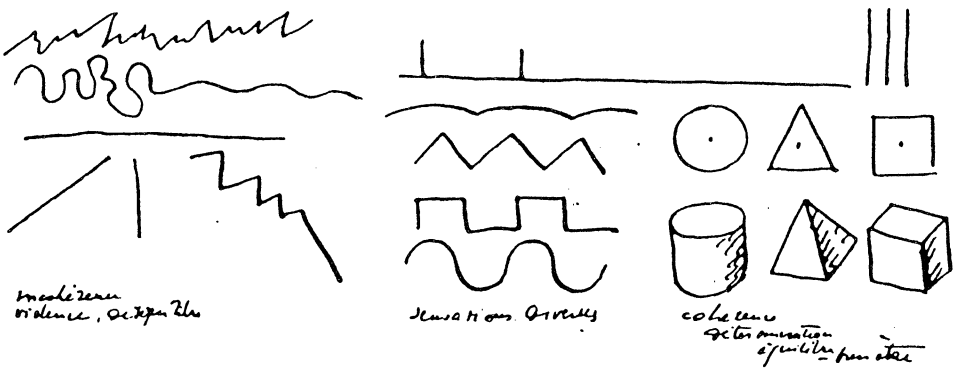

FIGURE 5. Le Corbusier, "Diagram of lines and forms as they affect the physiology of sensations," in *Almanach d'architecture moderne* (Paris, 1925), 35.

tial order of the Greeks, the institutional and typological order of the Romans, and the proportional systems of the modern French classicists of the sixteenth and seventeenth century. The representational modes for this kind of abstraction were likewise derived from the linear obsessions of neoclassicists: the purity of the line, the trace that allowed a contour, whether of a landscape or a body, to represent the "essence" of a natural form, ready to be converted into architecture. Thus Le Corbusier's characterization of the architectural drawing echoes all the commonplaces of "contour" theory after Johann Joachim Winckelmann: "A good and noble architecture is expressed on paper by a diagram [*une épure*] so denuded that an insider's vision is needed to understand it; this paper is an act of faith by the architect who knows what he is going to do." And, like Winckelmann against the baroque, Corbusier poses this essential abstraction against the conceits of the Beaux-arts architect: "On the other side, the flattering renderings of the ambitious architect titillate the eager client. *Drawing is in truth architecture's trap.*"[26]

The diagrammatic representations of such an abstraction were in this sense close replications of a "new world of space," as Le Corbusier called it, that was to dissolve all traditional monumentalisms, styles, institutions, and habitats in the universal flux of the abstract. Transparency, infinity, ineffability, liminality, and the expansive extensions of the post-Nietzschean subject demanded as few boundary conditions as possible; the thinner the line, the more invisible the wall. Succinct and economical, the architect's "*épure*" reduced a project to its essentials; it described the fundamental organization of a building tersely and in terms that seemed to correspond to the scientific tenor of the times; it was, in some sense the essence of the project, at once a correct and analytic representation of relations and a formal analog to the built structure itself.

Le Corbusier's moral stance in favor of the abstract drawing had its roots in the late Enlightenment, and his attitude toward drawing was remarkably similar to that of Durand. "Drawings," he argued late in 1939, "are made within four walls, with docile implements; their lines impose forms which can be one of two types: the simple statement of an architectural idea ordering space and prescribing the right materials—an art form issuing from the directing brain, imagination made concrete and evolving before the delighted eyes of the architect, skilful, exact, inspired; or alternatively we can be faced with merely a dazzling spread of engravings, illuminated manuscripts or chromos, crafty stage designs to bedazzle and distract—as much their author as the onlooker—from the real issues concerned." Architectural drawings were thus divided into two species: those that reveal the underlying structure and organization of the project and those that dissimulate in order to seduce the lay client. This contrast between the analytical and the sentimental, the rational and the deceptive, that echoes French critiques of rhetorical expression since Port Royal, was more than a formal distinction of representation, however; it was a touchstone by which to verify the authentic modernity of an architectural work, one that discarded the "illusion of plans" (to cite the title of his attack on Beaux-arts stylistics in *Vers une architecture*) in favor of a design that represented its own "idea." The drawing—a "simple statement of an architectural idea ordering space and prescribing the right materials"—would thereby serve as an instrument of correction and production for an architecture that, as far as possible in the translation from design to building, would represent itself transparently, so to speak, materializing its aesthetic and intellectual order as clearly as a mathematical formula.

IV

Modernist diagrams have not, however, been received without their own diagrammatic transformation at the hands of followers, epigones, and revivalists. Le Corbusier's rapid sketches, diagrammatic as they were, were redolent of spatial and aesthetic potential compared with those prepared by the following generation, either in drawn or built form. Thus the polemical and geometrically closed diagrams of Albert Frey, in their attempt to clarify the principles of modern-movement environmental ideals, rigidly codify both technology and space (fig. 6).[27] Other followers of the first generation of modernists *built* diagrammatic buildings to exemplify modernist principles—among the best known would be Philip Johnson's quasi-Miesian Glass House in Connecticut of 1949 (itself a codification of Johnson and Henry-Russell Hitchcock's own codification of modernism as "international style") and Harry Seidler's post–Marcel Breuer house for his mother of the same year in Sydney, a perfect composite model of a villa with elements from Le Corbusier's Poissy, Breuer's early Connecticut houses, and Oscar Niemeyer's sense of color

and space. Such diagrams, widely repeated in the 1950s, were essential in the gradual transformation of modernism from its status as a style for the cultural elite, or a minimal response to mass housing needs, to a generalized way of life for middle-class suburbs.

Architectural historians, as they have sought to reduce the complexity of architectural experience to formal order, have also played a role in the diagramming of space and structure, starting early enough with Paul Frankl and A. E. Brinckmann between 1914 and 1924.[28] Their schematic renderings of historical space prepared the way for a host of similar spatial analyses heavily informed by gestalt psychology. Perhaps the most celebrated, and in the realm of architectural practice the most influential, was the page of systematized diagrams of Palladian villas published by Rudolf Wittkower in 1949 (fig. 7).[29] The Wittkower diagram resonated with a post-war generation of modernists looking for a geometrical and stable authority for form in the demonstrated absence of any single functional determinants. Alison Smithson and Peter Smithson, among others, were drawn by the idea of the existence of what might have been "architectural principles in the age of humanism" to develop a new and rigorous geometrical modernism.[30]

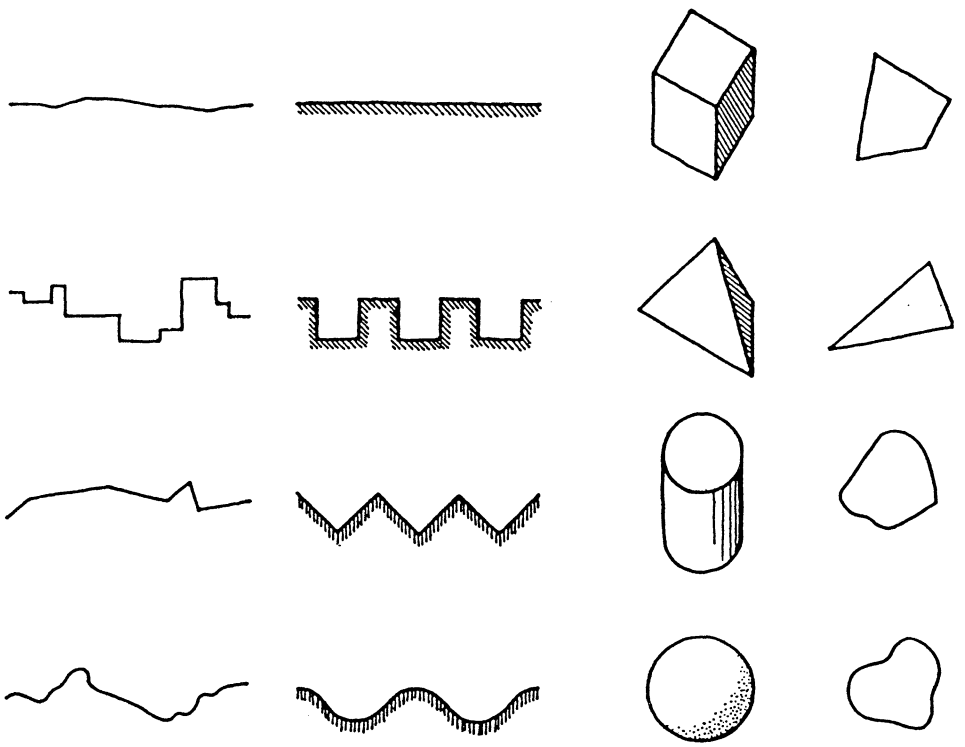

FIGURE 6. Albert Frey, "Shape," in *In Search of a Living Architecture* (New York, 1939).

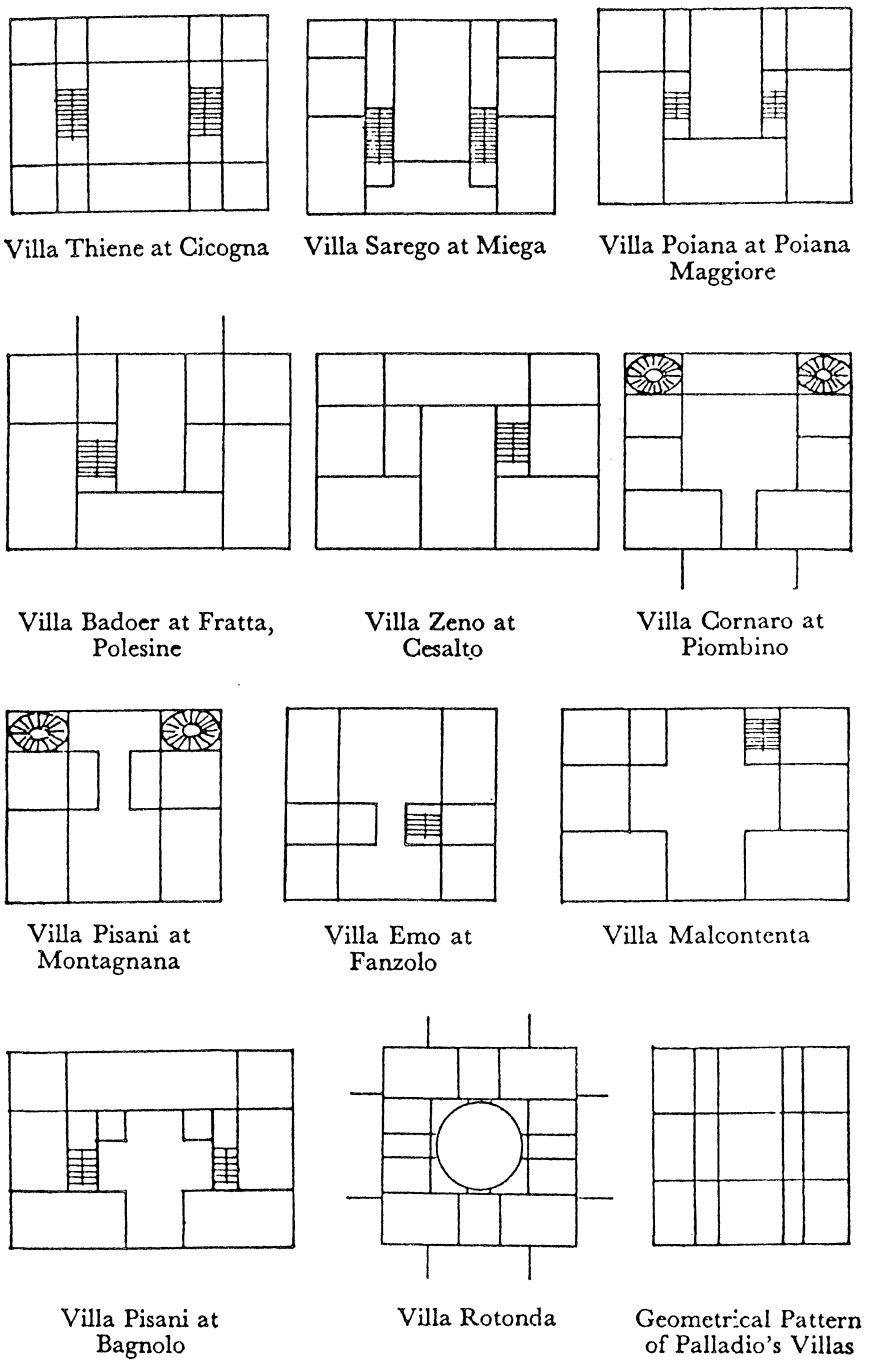

FIGURE 7. Rudolph Wittkower, Palladian Villa Types, in *Architectural Principles in the Age of Humanism* (London, 1952).

In 1947 this humanist diagrammatics was taken further, now with respect to the villas of Le Corbusier, by the architectural historian John Summerson who, in a lecture to students at the Bristol College of Architecture delivered in 1947, characterized Le Corbusier's transformation of the conventional house as a mark of his "witty, sublime-nonsensical approach to architectural design," his penchant for "sudden, irresistable" "topsy-turvydom." He was referring to the systematic reversals in function and spatial organization that appear, for example, in the villas at Garches or Poissy. If traditionally a house had four walls, Le Corbusier constructed it out of four windows; if a house normally stood in a garden, Le Corbusier would have the garden in the house, and so on. We might add to Summerson's list: if a house stands on the ground, Le Corbusier raises it up, and if a house is centrally planned, Le Corbusier emphasizes peripheral movement.[31] In the same year Colin Rowe, a former pupil of Wittkower, published a seminal essay on Le Corbusier, "The Mathematics of the Ideal Villa," demonstrating that what for Summerson was nothing more than "witty nonsense" represented in fact a programmatic concern for marking the distance and the relationship between modernism and tradition, between the prototype Palladian villa of aristocratic and bourgeois life and the Corbusian version, between traditional space and modern space.[32] Rowe's versions of the diagrams of Le Corbusier's villas at Poissy and Garches have themselves become the canonical references for late-modernist space, referred to by architects as diverse as Rem Koolhaas, in, for example, his own mutation of the twentieth-century villa in the recently completed House at Bordeaux, and Greg Lynn, in his appeal for (digital) geometry to be restored to its primary place in the generation of architecture.

V

The recent attention to diagrammatic form in architecture may then be seen, on one level, as a testimony to the resilience of modernist ideologies, aesthetics, and technologies among those architects who had never thoroughly embraced the return to the past championed by neohistoricists and new urbanists. Thus, continuing modernists celebrate the diagram, in what one can only call a neomodernist return by many architects to rationalist simplicity and minimalist lucidity. Here the appeal to the diagram is both polemical and strategic. In its reduced and minimal form it dries out, so to speak, the representational excesses of postmodernism, the citational hysteria of nostalgia, and the vain attempts to cover over the inevitable effects of modern technologies, effects that modernists had attempted to face with the invention of abstract aesthetics. In its assertion of geometry as the basis for architecture, it opens the way for a thorough digitalization of the field, but in a way that overcomes the simplistic and often rigid models based on functional analysis proposed by design-methods theorists like Christopher Alexander in the early decades of computerization.

But the stakes of diagram architecture go beyond a simple reaction to the postmodern, and a somewhat retro affection for the old or not-so-old modern, which itself might be interpreted as a postmodern turn. The excitement of digital aesthetics; the potential of mapping, finally, space, time, and movement in formal terms; the possibilities inherent in direct milling from design to finished object, all these too might be understood, if not as directly postmodern in affect, certainly as smoothing the transition from an old industrial to a new digital world—one where the distance between image and reality can no longer be measured by any critique of the spectacle.

More fundamentally, the intersection of diagram and materiality impelled by digitalization upsets the semiotic distinctions drawn by Charles Sanders Peirce as the diagram becomes less and less an icon and more and more a blueprint—or, alternatively, the icon increasingly takes on the characteristics of an object in the world. The clearest example of this shift would be the generation of digital topographies that include in their modeling "data" that would normally be separately diagrammed—the flows of traffic, changes in climate, orientation, existing settlement, demographic trends, and the like. Formerly these would be considered by the designer as "influences" to be taken into account while preparing a "solution" to the varied problems they posed. Now, however, they can be mapped synthetically as direct topographical information, weighted according to their hierarchical importance, literally transforming the shape of the ground. The resulting "map," however hybrid in conception, is now less an icon to be read as standing in for a real territory than a plan for the reconstitution of its topographical form. Similarly, "blobs," however much they look like geometrical diagrams of form, architectural or not, are robbed of their iconic status in favor of their programmatic role in the production of the forms they image.

In this context, the question of architectural abstraction, whether in representation or in building, takes on an entirely new significance. For what seems to be at stake is the instability provoked between the new formal vocabularies generated by the computer and their easy translation into built form, so as to produce, almost simultaneously, an image *as* architecture and architecture *as* image. That is, where traditionally in classical and modernist works the architecture might image an idea, be imaged itself, or produce an image of its own but at the same time take its place in the world as experienced and lived structure and space, now the image participates in the architecture to an unheralded degree, a condition that calls for, if not a postdigital reaction, certainly a reevaluation of the nature and role of abstract representation in the production of (abstract) architecture.

For the question raised by the new digital diagrams is whether they are in fact abstract at all, at least in the sense of the word used by modernist aesthetics. Where Corbusian and Miesian diagrams held within them the potential of form to be realized as abstract spatial relations—abstractions of abstractions, so to speak—the digital drawing is nothing more nor less than the mapping of three- or four-

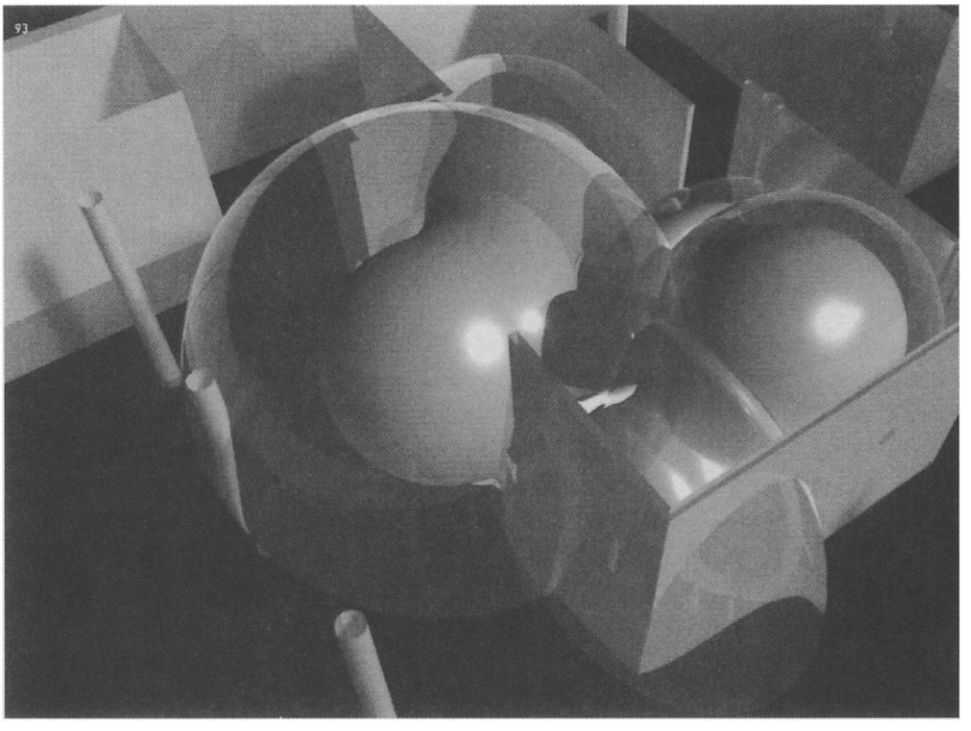

FIGURE 8. Greg Lynn, Artists Space, 1995, Axonometric, in *Animate Form* (New York, 1999), 67.

dimensional relations in two, more like an engineering specification than an abstraction. The aesthetics of digitalization, moreover, seem driven less by a polemical belief in the virtues of an abstract representation of a new world, than by the limits of software's replication of surface, color, and texture and its notorious aversion to any ambiguity: the potential openness of the sketch, of the drawn line in all its subtleties, is reduced to thin-line clarity and allover surface pattern. It would seem, then, that a new approach to aesthetics must be forged in the face of such drawing, one that would take into account the changing definitions of the "real," the "image," and the "object" as it is subjected to the infinite morphings and distortions of animation. An aesthetics of data, of mapped information, would in these terms differentiate itself from the diagrammatic functionalism of the modern movement as well as from the long-lived neo-Kantianism that has served modernism's aesthetic judgments since the Enlightenment. Modernism in these terms has shifted from a diagram that is rendered as an abstraction of an abstraction to one that is a diagram of a diagram (fig. 8).

Notes

The themes of this essay are a development of questions opened up in my *Warped Space: Art, Architecture, and Anxiety in Modern Culture* (Cambridge, Mass., 2000), and were inspired in part by a symposium on "The Activist Drawing," on the occasion of an exhibition of Constant's New Babylon drawings, held at the Drawing Center in New York and organized by Catherine de Zegher and Mark Wigley. The paper I delivered on that occasion, "Diagram Utopias," will be published by MIT Press in *The Activist Drawing*, edited by Mark Wigley and Catherine de Zegher, forthcoming from MIT Press.

1. See Greg Lynn, *Animate Form* (New York, 1999).
2. See MVRDV, *Metacity/Datatown* (Rotterdam, Neth., 1999).
3. I am referring to recent projects by Rem Koolhaas (The House at Bordeaux, 1999; the entry for the competition for the French National Library, 1989) and by Zaha Hadid.
4. I am, of course, using Frank Gehry's recently completed Guggenheim Museum, Bilbao, Spain, as the basis of this pastiche.
5. For a useful summary of this revived sensibility for the diagram, see the collection of essays edited by Ben van Berkel and Caroline Bos in *ANY*, no. 23 (1998).
6. Rem Koolhaas, *S,M,L,XL: Small, Medium, Large, Extra Large* (New York, 1994).
7. Toyo Ito, "Diagram Architecture," *El Croquis*, 77, no. 1 (1996): 18–24.
8. Ibid.
9. See, for example, Pier Luigi Nicolin, "The Tao of Sejima," *Lotus* 96 (1998): 7–9. Nicolin takes issue with Ito's interpretation of Sejima's translucent and transparent "membranes" as a reflection of the high-speed media metropolis and proposes instead an alternative reading—that of deceleration and slowdown. This, he argues, might represent a shift from "a sociological, or mimetic, phase, related to the world of information processing, to a scientific, philosophical or mystical phase."
10. Peter Eisenman, *Diagram Diaries* (New York, 1999).
11. R. E. Somol, "Dummy Text, or the Diagrammatic Basis of Contemporary Architecture," in Eisenman, *Diagram Diaries*, 24.
12. I have sketched the historical background of this technological revolution in architecture in "Technologies of Space/Spaces of Technology," *Journal of the Society of Architectural Historians* 58, no. 3 (September 1999), special issue: "Architectural History, 1999/2000": 482–486.
13. A useful review of these diverse tendencies is to be found in Peter Zellner, *Hybrid Spaces: New Forms in Digital Architecture* (New York, 1999).
14. Walter Benjamin, "Rigorous Study of Art: On the First Volume of the *Kunstwissenschaftliche Forschungen*," trans. Thomas Y. Levin, *October* 47 (Winter 1988): 89. This is a translation of Walter Benjamin, "Strenge Kunstwissenschaft. Zum ersten Bande des *Kunstwissenschaftliche Forschungen*," *Frankfurter Zeitung*, 30 July 1933, appearing under Benjamin's pseudonym Detlef Holz; republished in Walter Benjamin, *Gesammelte Schriften* (Frankfurt am Main, 1982), 3:363–74.
15. Robin Evans, *Translations from Drawing to Building and Other Essays* (London, 1997), 156. The original article, "Translations from Drawing to Building," *AA Files* no. 12 (Summer 1986): 3–18, introduced a subject that was to be developed in brilliant detail in his

posthumously published *Projective Cast: Architecture and Its Three Geometries* (Cambridge, Mass., 1995).

16. Indeed it is significant that the only large-scale exhibition dedicated solely to the architectural drawing mounted by a major museum in recent years was the decidedly ambiguous installation of nineteenth-century drawings from the Ecole des beaux-arts at the Museum of Modern Art, New York. Here, the obvious target was modernism itself, the "International Style" imported by its first architectural curator, Philip Johnson, together with Henry-Russell Hitchcock in 1932. Obviously appealing to a public said to be tired of minimalism and abstraction in architecture and a profession preoccupied with "meaning," "signification," and the communicative power of architecture to a broader public, this show of ideal projects had, save in its last-minute presentation of Charles Garnier's Paris Opéra, little to do with actual building. For a critical review of this exhibition with regard to the tradition of the Museum of Modern Art, see William Ellis, ed., "Forum: The Beaux-Arts Exhibition," *Oppositions* 8 (Spring 1977): 160–75.
17. See Victor Hugo, "Guerre aux démolisseurs!" (1825–32), in *Oeuvres complètes: Critique*, ed. Pierre Reynaud (Paris, 1985), 187; Henri Lefebvre, *The Production of Space*, trans. Donald Nicholson-Smith (Oxford, 1991), chap. 4: "From Absolute Space to Abstract Space."
18. Lefebvre, *Production of Space*, 361.
19. Henri Focillon, *The Life of Forms in Art*, trans. Charles Beecher Hogan and George Kubler (New York, 1992), 33.
20. See Werner Szambien, *Jean-Nicolas-Louis Durand, 1760–1834. De l'imitation à la norme* (Paris, 1984).
21. J.-N.-L. Durand, *Précis des leçons d'architecture données à l'Ecole royale polytechnique* (1805) (Paris, 1819), 1:34, my translation.
22. Ibid., 32. 23. Ibid.
24. Auguste Choisy, *Histoire de l'architecture*, 2 vols. (Paris, 1899); Le Corbusier republished many of his axonometrics that displayed in one projection the space and structure of the buildings represented in the journal *L'esprit nouveau* between 1920 and 1921, and again in Le Corbusier, *Vers une architecture* (Paris, 1923).
25. Le Corbusier, *Vers une architecture*, 35. My translation.
26. Le Corbusier, *Sur les quatre Routes* (Paris, 1941), cited in Jacques Lacan, ed., *Le Corbusier: une encyclopédie* (Paris, 1987), 118–19, my translation. The English translation, Le Corbusier, *The Four Routes*, trans. Dorothy Todd (London, 1947), 147–48, fails to render the clarity of Le Corbusier's argument.
27. See Albert Frey, *In Search of a Living Architecture* (New York, 1939). Here Frey, under the heading "Diagrams" simplifies and systematizes Le Corbusier's sketches of formal and spatial principles while developing them with respect to American landscape and climate.
28. See Paul Frankl, *Principles of Architectural History: The Four Phases of Architectural Style, 1420–1900*, trans. James F. O'Gorman (Cambridge, Mass., 1968); and A. E. Brinckmann, "Schematic Plans of Renaissance and Baroque Spatial Groups," *Plastik und Raum. Als Grundformen Künstlerischer Gestaltung* (Munich, 1924).
29. Rudolph Wittkower, *Architectural Principles in the Age of Humanism* (London, 1949).
30. See Reyner Banham, "The New Brutalism," *Architectural Review* 118 (1955): 355–61.
31. John Summerson, "Architecture, Painting, and Le Corbusier," in *Heavenly Mansions and Other Essays on Architecture* (1948) (New York, 1963), 177–94.
32. Colin Rowe, "The Mathematics of the Ideal Villa, Palladio and Le Corbusier Compared," *Architectural Review* 101(1947): 101–4.

Notes

[14] **Rigorous Study of Art**
Walter Benjamin; Thomas Y. Levin
October, Vol. 47. (Winter, 1988), pp. 84-90.
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