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**The Diagram as a Vehicle of Transposition
in the Quest of Architectural Form:
Program | Typology | Drawing**

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Abstract

This paper discusses the impact of diagrammatic processes into architectural design. The diagram may be related to its scientific origin as a means of analysis and comparison of data. In accordance with diagrammatic interpretations of Jeremy Bentham's *Panopticon*, also with Gilles Deleuze's notion of "abstract machine," the diagram operates in architecture as a means expressing the dynamic relationships among different elements having spatial significance. With the use of diagrams, abstract information of analysis is transposed into architectural design by using codes of spatial definition. The diagram may thus be distinguished from architectural form, as the connection between them remains metaphorical.

From a theoretical point, such an explanation of the diagram is illuminating, also tying up with computational practices using advanced CAD software; however, ambiguities may be raised due to the fact that, in practice, essential issues regarding the diagram's overall functionality are often being disregarded. For example: under what conditions might it be useful arguing that the diagram has no relationship whatsoever with a sketch drawing of an architectural idea? Or, upon the assumption that the diagram is a tool aiding the conceptual manipulation of data and besides any of its representational capabilities, how would it be beneficial denying its direct or indirect contribution as a harbinger to architectural synthesis?

In response, this paper redeploys the applications of the diagram in the transition from abstract notions to the first graphic sign and the gradual development of an architectural project. Respectively, the diagram is related to data analysis, the defining of the program, the building type and the architectural drawing.

Introduction

The diagram's influence in architectural design may be described in relation to Gilles Deleuze's notion of "abstract machine"¹ for the graphic expression of the dynamic relationships among different elements having spatial significance. Such an explanation of the diagram is illuminating, also tying up with computational design practices using advanced Computer Aided Design (CAD) software; however, ambiguities may be raised due to the fact that, in practice, essential issues regarding the diagram's overall functionality are often being disregarded. For example: under what conditions might it be useful arguing that the diagram has no relationship whatsoever with

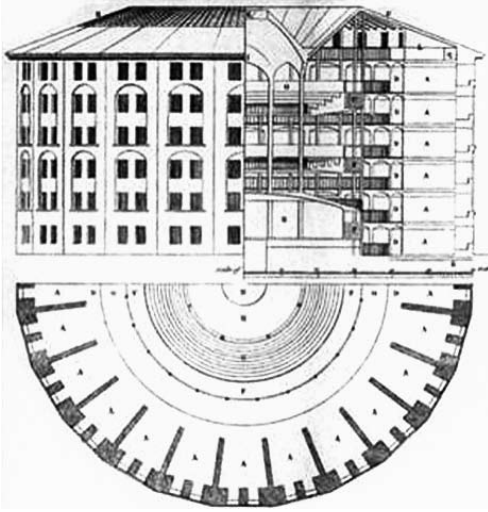


Fig 1

a sketch drawing of an architectural idea? Or, upon the assumption that the diagram is a tool aiding the conceptual manipulation of data and besides any of its representational capabilities, how would it be beneficial denying its direct or indirect contribution as a harbinger to architectural synthesis?

In response, this paper redeploys the applications of the diagram in the transition from abstract notions to the first graphic sign and the gradual development of an architectural project. With diagrams, information of analysis is converted to measurable data – thus being also useful for synthesis; in such, the diagram connects theory with practice. Respectively, common practices, tools and aids are compared to the diagram's overall functionality in architecture.

The diagram as a medium expressing spatial relations

The diagram's significance in architecture as "abstract machine" is manifest in Jeremy Bentham's *Panopticon* (fig.1). Michel Foucault describes *Panopticon* as the diagram of a disciplinary mechanism that was extensively applied since 19th century in authorities exercising individual control, such as the psychiatric asylum, the penitentiary, the reformatory, the school and the hospital. With its diverse applications, *Panopticon* becomes an icon of "Panopticism:" a generative spatial order securing the pursued relationships of power; an abstraction of its functioning reduced to its ideal form; a pure architectural and optical system.² Still, Hyungmin Pai remarks, *Panopticon* remains a utopia, a non-place: the moment it is projected as an actual structure, the realities of space, light, and time begin to erode the concept. Additionally, *Panopticon* may be used to describe various cases of circulation and sequencing, also limits between inside and outside, private and public and many more spatial settings. Apparently, *Panopticon* is much more useful in architecture as a diagram, than any of its spatial applications alone; indeed, Bentham's "simple idea in architecture" can never be drawn out as an equivalent architectural plan.³

Starting with the above definition, the diagram's main functioning in architecture is not to represent spatial entities or systems, but rather to graphically express the abstract relations among the parts about a complex phenomenon having spatial implications.⁴ For Jesse Reiser and Nanako Umemoto "the diagram is a field of relationships awaiting a scale and a materiality;" it is elastic yet precise,⁵ an abstract schema and a specific numeric output altogether. As Peter Eisenman notes, "a[A] diagram derives from the context of a site, program, or history. A diagram does not necessarily exist a priori in any project. In this sense, it is not like a type which has a fixed relationship to form, function, and history."⁶ A diagram may be teased out of various factors such as function and the site, whereas due to its schematic nature these factors may be interpreted differently. Diagrams further help to understand architecture, Robert Somol remarks, as "a discursive-material field of cultural-political plasticity,"⁷ one that is broad, adaptive and open to socio-political influences. Eisenman even treats architectural form as data open to analysis, a set of spatial elements ready to decompose, an abstract form; essentially, as a spatial diagram. Viewed as a diagram, form is unrestrained by aesthetic significations and space is studied down to its essence.⁸ As Pai notes, such a process is reverse to composition, a kind of "decomposition ... in the sense that through analysis of structures, of what we see, we uncover more and more possibilities for development rather than refining the initial image."⁹ The diagram thus plays a double role. It is a manner of notation (recognizing, interpretive and reflective) and also a machine of action (operational, generative and productive): diagnosis and response, map and trajectory.¹⁰ The diagram's overall functionality is therefore theoretical and analytic as much as it is practical and synthetic.

Either as a tool for analysis, or as an incentive for synthesis, the diagram is characterized by potentiality and openness towards creative action. While it introduces possibilities of facts, neither it constitutes a fact, nor is it an explicit architectural proposition.¹¹ It is performative, suggestive and dynamic, not representational and fixed.¹² As Eisenman proposes, "a(A) diagram is not a plan, nor is it a static entity. Rather it is conceived of as a series of energies which draw upon the interiority and anteriority of architecture as a potential for generating new configurations."¹³ The diagram must be approached not simply as an isolated indication (e.g. element A influences B and vice versa), but as part of a larger discursive formation adding scientific denotation to the design process.¹⁴ The diagram is thus constructed as a mediatory mechanism at the architect's service, in order for him to control the object of his attention, thereby to bridge analysis with synthesis and theory with practice alike.

Between diagram and form

The diagram preserves a critical distance between idea and form, as it also creates semantic links between them. Due to its mechanistic function, a wide series of variations of the diagram, accordingly of form, may be developed. With computation, related processes have been automated. As Greg Lynn describes, form may be determined by applying external forces onto an archetype, which undergoes constant transformations.¹⁵ The selection of one form would coincide with a freezing moment of such transformation processes. As a result, the main task of

design has gradually departed from the completion of a form that was more or less conceived from the start. Form would not obey to aesthetic preconditions and design principles;¹⁶ it would rather reflect the resultant meaning regarding associations that have been set during analysis. Form would be the weak outcome of fusion, open to the influence of new data. In an updated understanding of the design process, Panayotis Tournikiotis notes, the quest of form would reflect a growing interest towards programming and redefining of the principles and the strategies of design through multiple input/output data processes.¹⁷ In such, the diagram's main contribution is that it offers itself as a tool of examination of each of the variations according to preset requirements; in so doing, it conveys procedural methods of analysis and abstraction in the quest of form, thus contributing to its understanding as a spatial system in constant transformation, not as a more or less fixed entity.

The general aim of diagrammatic processes is to reorganize information in order to readdress meaning directed to form. Any of the differences between the diagram and form may be addressed in analogy to the special relationship between them. As with *Panopticon*, the diagram does not imitate form; rather it represents relationships being transferred to spatial structure and order.¹⁸ The passage from diagram to form may better be described as transposition, in which the related expressive means are set with different codes. As such, the connection between diagram and form remains metaphorical. Additionally, due to its mechanistic function, the diagram may be related to its origin in science as a tool for analysis and comparison of data, whereas due to abstraction the possibility for direct functional or aesthetic similarity between the diagram and form is avoided. As a result, the diagram would add semantic complexity and depth,¹⁹ acting as a rhetorical argument about an end. As Eisenman comments, “(T)he diagram is part of a process that intends to open architecture to its own discourse, to its own rhetoric and thus to potential tropes which are latent within it. ... Through the agency of the diagram, which is a manifestation of architecture's interiority, architecture has the possibility of not merely representing but transforming and being critical of these socio-political conditions.”²⁰ Generally, the relationship between diagram and form is set in order to illustrate a definition, to substantiate an argument, to aid in the proof of a proposition, also to represent the course or results of any action process towards a proposed spatial order, the design principals and eventually architecture.²¹

Apart from any formal imitation of the diagram, a deeper understanding of it is proposed. The diagram is a practical and also a conceptual escort in the various phases of design. It is constructed through processes of data decomposition, decoding and manipulation, recoding, reorganizing and graphic expression; in so doing, the diagram may add value to an idea, thereby enriching the design process. We may thus look carefully at the function of the diagram on the one hand, as Vidler notes, its potential of mutation, of endless transformation and becoming, that sets up so many points of emergence or creativity, helping us in developing an insurgent architectural practice.²² On the other hand, concerning the profits from the use of diagrams in design, considerable doubts remain. Admittedly, the diagram is not a purely mechanistic imple-

mentation of the intellect upon matter, in scientific terms; even more, with diagrammatic processes, architecture does not necessarily bypass existing typologies. As Pia Ednie-Brown notes, “w(Wh)ile the diagram is seen to offer an escape from the trappings of representation, architecture nevertheless operates in a representational field.”²³ After all, intuitive procedures related to inspiration, experience, ease, or intellectual ability being far from the diagram’s scientific origin, are still very much active in contemporary design.

The diagram’s manifold substances may be addressed both in its mechanistic value as a procedural tool supporting the progressive transformation of design and also in its abstraction value as an initiative for interpretive translation of form. Next, the present inquiry rejoins these two, by examining the diagram’s utility in architectural design. Specifically, the diagram is related to the defining of the program, the building type and the architectural drawing.

Abstraction as an initiative to interpretation

Many of the design choices of the next projects benefit from the extensive use of diagrams. In *Kunsthal*, Rotterdam (1993) (fig.2) by Office for Metropolitan Architecture (OMA), the main slabs are folded so that the adjacent spaces are extended into common spatial zones, such as rooms for exhibitions and events, foyers, corridors, a shop and a restaurant. Additionally, glass walls invoke spatial continuity between inside and outside. In *Yokohama Port Terminal* (2002) (figs.3, 4), by Foreign Office Architects (FOA), the circulation system is set as a mesh of interlaced loops, allowing for multiple return paths and crossing functions.²⁴ The whole is woven as an especially complex program of spaces and flows about boats, vehicles and pedestrians through terminal stations, passenger and luggage check points, short term and long term parking, also indoor, shaded and outdoor activities of rest, dining and shopping.²⁵ In *Seattle Library* (2004) (figs.5, 6), OMA’s later work, spaces of predefined and undefined functioning set up a mixed program of zone areas for information distribution with assorted media, also for public activities, amphitheatres, storage rooms, basements and offices. For such a development, horizontality and repetition are abandoned in favor of verticality and connectivity across levels. A shapeless glass surface envelops the interior. Contrary to a self-contained, single-used structure, or an enclosed shape with impermeable boundaries, the building is open and welcoming particularly at the ground level ensuring easiness of access from all sides, thus inviting to a direct back-and-forth interchanging of information and people with the city.²⁶ In *Utrecht University Library* (2004) (figs.7, 8), Wiel Arets Architects envision a data-event registering place. The visitors may consult books, work concentrated and meet other people in a comfortable atmosphere of quietude. Bookshelves, reading and meeting rooms are placed in higher levels as if they were hanging. Spatial continuity is momentarily interrupted by horizontal and vertical zones being connected by a labyrinthine system of stairs and ramps. A general feel of freedom about activities and movements in every direction is induced. The interior is delimited by a prismatic outer box. The box is tiled by a repetitive pattern, covering both the blind surfaces as relief and the glass surfaces as raster, also filtering the interior to the city. In *Luxor Theatre*, Rotterdam (2001) (figs.9, 10) by BOLLES+WILSON, the different areas are defined, organized, outlined and separated along a spiral wall. The arche-

typical ideogram of the spire adds theatrical value to the different spaces of the building: it conducts a series of plots between inside and outside, local continuums and events in human and building scale, also in relation to the city.

The main choices, the principles and the general character of the projects above, are closely connected to the parameters of analysis – sometimes being contradictory – regarding function, circulation, spatial configuration and the surroundings. In effect, *Yokohama Port Terminal* is developed as a continuous deck, whereas *Kunsthal* is defined by surfaces being folded. Additionally, the outer wrapping of *Utrecht University Library* is rigid and close, whereas those of *Seattle Library*, *Kunsthal* and *Yokohama Port Terminal* are shapeless and open.²⁷ Finally, the indoor and outdoor spaces in *Luxor Theatre* are arranged along a spiral wall. The oblique floor as an extended zone-limit in *Kunsthal*, the concave and convex manipulations of the wall in *Luxor Theatre* and its transformation to a flexible and adaptable unit, the interpretation of the outer limit as a transparent surface and the vertical spatial organization in *Seattle* and *Utrecht Libraries*, the mix-used decks in *Yokohama Port Terminal*, the sequential or irregular spatial order, the rigid or free-shaped outer envelope, these are not predetermined formal choices; rather, they are responsive to the desired relationships – not only being spatial – that were set in analysis first in notes, then in diagrams and sketches, in order to be gradually infused into the program, the building type and the design.

Respectively, the program acquires pivotal significance. The program relates space to function by setting the dynamic relationships among the parts making up the whole, thus becoming a prerequisite for complexity and richness about a design. Most often, the solution of same slabs being vertically repeated fails to respond to a general claim for programmatic complexity. Relatively, OMA address horizontality as the main weakness of the traditional library, later proposing a spiral circulation with vertical connections among the horizontal levels and the area zones in *Seattle Library*.²⁸ Programmatic complexity further invokes variations on typology. Typology refers to an idea about a building regarding spatial order and the relationships among the parts. The building type would be a normative chart being attached to a series of programs and accordingly of designs having proportional requirements. Moreover, the building type is greatly affected by the different interpretations of the spatial limit, for example as a solid wall, a transparent partition, a level difference and an intermediate zone area. Due to the intricacies of the program and of the spatial limit, the existing typologies are often insufficient. Factually, the building type cannot afford any aesthetic or direct architectural judgment; instead, as it has been shown, it may convey the dynamic character of diagrammatic analyses to the program and likewise to the design. Rather than a point of departure, or a system of reference, the building type may emerge from the design objectives in a case-by-case basis, so that data from the program is translated to spatial configuration and then carried out by the architectural drawing.²⁹

In respect, the architectural drawing may be viewed as a kind of diagrammatic schema articulating space in regards to the information of analysis, its variety, potentials and dynamics. Seen as

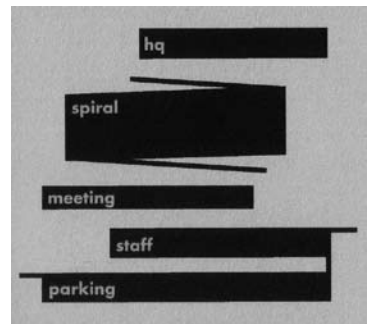
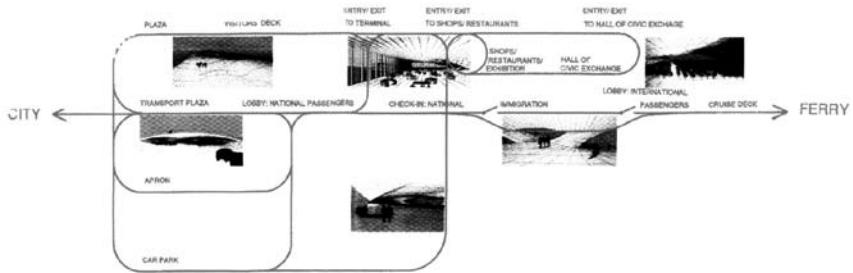
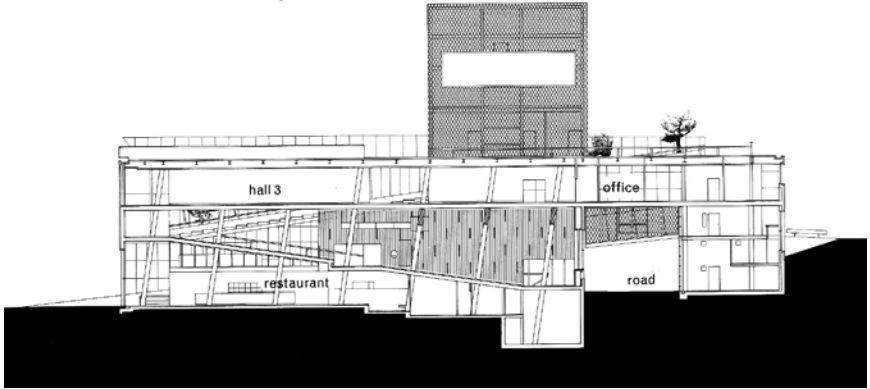


Fig 2-5

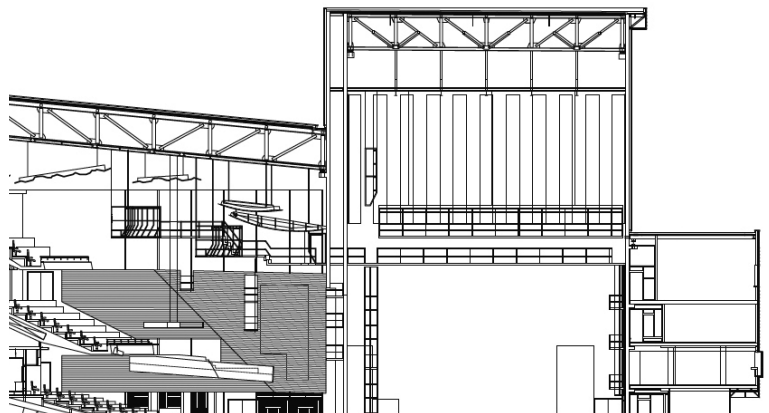
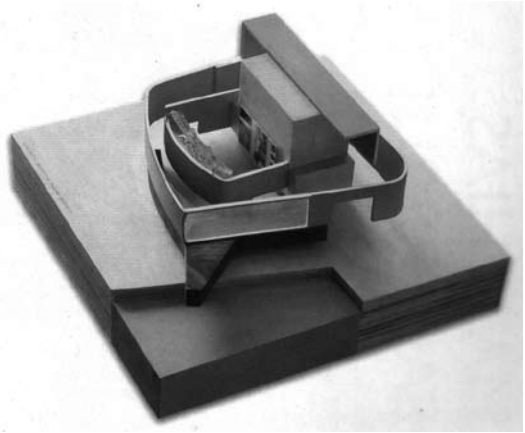
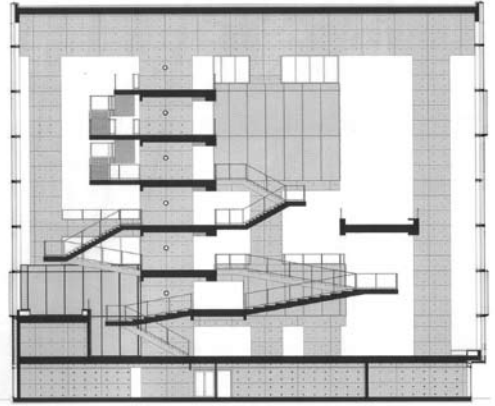
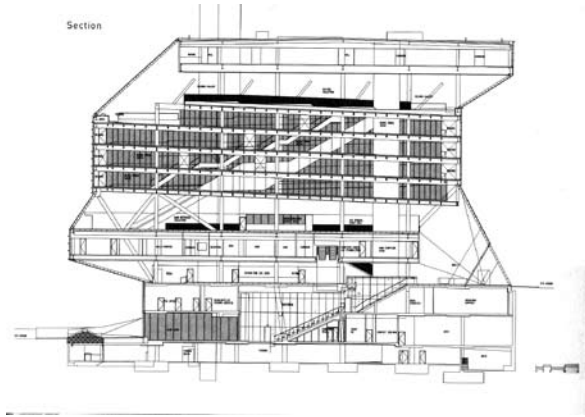


Fig 6-10

a diagram, the architectural drawing holds – architecturally codified – information about various conditions and activities. The architectural drawing thus sets the relationships among the areas it defines. Accordingly, the plan drawing, contrary to its denominative character, may be unsuitable when planning a project; instead, the section may offer a more comprehensive supervision of the whole. Acting as a vertical x-ray, the section indexes the distributed areas according to the program, the typology and the appointed design principles. The section renders the different areas by also being suggestive of their comparative significance including the inside, the outside and the circulation system. Spatial unification or compartmentalization in section permits or impedes the free distribution of light, sound, air, also the gaze and the various spatial conditions into the building.³⁰ Ideally, the section would encompass the information of the diagrams made throughout the design process, thereby contributing even more in the quality evaluation about a project.

Besides its mechanistic function, the diagram further promotes new ways of thinking. The diagram's connection to program, typology and drawing has been exemplary in addressing abstraction in response to the interpretive capabilities it opens. The diagram is not merely a procedural tool; it is symbolic of intellectual processes. In such, preformed criteria and design principles are already being invested into – also applied upon – the existing architectural means of expression, not necessarily being substituted by new modes of architectural production due either to the diagram, or to new technologies, or to any of the contemporary design methods. In so doing, the means and methods of architectural expression become imaginative ones constructing ideas, further underpinning an interpretive character to creativity.

Notes

- 1 "An abstract machine in itself is not physical or corporeal, any more than it is semiotic; it is *diagrammatic* (it knows nothing of the distinction between the artificial and the natural either.) It operates by matter, not by substance; by *function*, not by form. Substances and forms are of expression 'or' of content. But functions are not yet 'semiotically' formed, and matters are not yet 'physically' formed. The abstract machine is pure Matter-Function – a diagram independent of the forms and substances, expressions and contents it will distribute" [Gilles Deleuze & Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, 1980 Brian Massumi trans., (Minneapolis/London: University of Minnesota Press), 1987, p.141].
- 2 Michel Foucault, "Panopticism," in *Discipline and Punish: the Birth of the Prison*, p.205. Also Anthony Vidler, "What is a Diagram Anyway?", in Peter Eisenman, *Feints*, (Milan: Skira), 2006, p.22.
- 3 Hyungmin Pai, *The Portfolio and the Diagram: Architecture, Discourse, and Modernity in America*, (Cambridge: MIT Press) 2002, p.170.
- 4 See Manuel Gausa, Vicente Gualart, Willy Muller, Federico Soriano, Fernando Porras, Jose Morales, *The Metapolis Dictionary of Advanced Architecture*, (Barcelona: ACTAR), 2003, p.162.

- 5 Jesse Reiser + Nanako Umemoto, *Atlas of Novel Tectonics*, (New York: Princeton Architectural Press), 2006, p.116.
- 6 Eisenman, *Feints*, p.204.
- 7 R.E. Somol, "Dummy Text, or The Diagrammatic Basis of Contemporary Architecture," in Peter Eisenman, *Diagram Diaries*, p.24.
- 8 Eisenman, *Diagram Diaries*, pp.54-63.
- 9 Pai, p.284.
- 10 Manuel Gausa, Vicente Guallart, Willy Muller, Federico Soriano, Fernando Porras, Jose Morales, *The Metapolis Dictionary of Advanced Architecture*, (Barcelona: ACTAR), 2003, p.164.
- 11 Gilles Deleuze, "Francis Bacon: the logic of sensation," continuum, (London-NY: 2004), p.194. Also, Lawrence Barth, "Diagram, Dispersal, Region," in M. Mostafavi ed., *Landscape Urbanism*, (London: AA), 2003, p.39. Also, Eisenman, *Diagram Diaries*, (London: Thames & Hudson), 1999, pp.32,34.
- 12 See R.E. Somol, "Dummy Text, or The Diagrammatic Basis of Contemporary Architecture," in Eisenman, *Diagram Diaries*, p.8.
- 13 Eisenman, *Diagram Diaries*, pp.37-8.
- 14 Pai, p.163. Also Gausa, Guallart, Muller, Soriano, Porras, Morales, *The Metapolis Dictionary of Advanced Architecture*, (Barcelona: ACTAR), 2003, p.162.
- 15 See for example Greg Lynn, *Animate Form*, (New York: Princeton Architectural Press), 1997.
- 16 "Form itself is no longer the receptacle of intuition, it loses its unity, it is constituted in movement and in permanent interrelation [Gausa, Guallart, Muller, Soriano, Porras, Morales, *The Metapolis Dictionary of Advanced Architecture*, (Barcelona: ACTAR), 2003, p.164].
- 17 Panayotis Tournikiotis, "The Mutant Unity of Contemporary Architecture," (Athens: Futura), 2006, p.239. Also, Pai, pp.237-238.
- 18 Pai questions the limits among diagram, drawing and form: "at what point does the diagram become a plan? ... we may conclude that if there is a diagram that can generate form, *such a diagram is already form*" (Pay, p.248).
- 19 In respect, Silvio Cassara comments Eisenman's design for the Church of the year 2000: "it is not a question of denying the function and the meaning of the object, but rather of discussing the legitimacy of the formal decision made in its name" [Silvio Cassara, "Subject-object-complement. Brief Chronicle of an 'Unexpected' Architecture," in Eisenman, *Feints*, p.13].
- 20 Eisenman, "Diagrams of Anteriority," in *Diagram Diaries*, p.37.
- 21 Vidler, "What is a Diagram anyway?," in Eisenman, *Feints*, p.19.
- 22 Vidler, "What is a Diagram anyway?," in Eisenman, *Feints*, p.25.
- 23 Pia Ednie-Brown, "The Texture of Diagrams: Reasonings on Greg Lynn and Francis Bacon," in *Daidalos vol.74 Diagrammania*, October 2000, p.72.
- 24 The architects explain: "rather than setting the program as a series of adjacent spaces with more or less determined limits, we articulated them in the continuity of a branched sequence along the circulatory system" [Foreign Office Architects, *Phylogenesis: Foa's Ark*, (Barcelona: ACTAR), 2003, p.228].
- 25 Ibid., pp.228, 232.
- 26 *Seattle Public Library: OMA/LMN Verb Monograph*, (Barcelona: Actar), May 2005, p.48.
- 27 As FOA explain, the space of Yokohama Port Terminal is differentially flexible, which means that it offers multiple conditions in a continuum across levels and between outside and inside spaces. Rather than turning the building into a sign, they thought of a very flat building, and from there they moved into turning the building into a ground. (Foreign Office Architects, pp.230-232).
- 28 *Seattle Public Library: OMA/LMN, Verb Monograph*, (Barcelona: Actar), May 2005, p.34.
- 29 Relatively, Eisenman addresses the differences between the type and the diagram: "while type moves towards abstraction, it does so in a way that reduces the model, the copy, or the original. The diagram, on the other hand, contains more than the model. The type and the diagram are two different conditions of abstraction: type, the

abstraction of a reduction to a normalization, and diagram, the abstraction that may generate into something more than the thing itself, and thus potentially overcome normalization" [Peter Eisenman, *Diagram Diaries*, pp.41-2]). Pai, on the other hand, describes type relatively to the diagram, in a more consenting way: "the type is no longer the central visual object of a tightly woven analogical system but a loose diagrammatic configuration ... the type is a 'schema of spatial articulation,' devoid of 'value judgment'" (Pai, pp.253-4).

- 30 See Gausa, Guallart, Muller, Soriano, Porras, Morales, *The Metapolis Dictionary of Advanced Architecture*, (Barcelona: ACTAR), 2003, pp.541,604. In respect, Sofia Vyzoviti notes the significance of the section drawing in the work of OMA, MVRDV, FOA and Diller & Scofidio [Sofia Vyzoviti, "Folding Architecture: Ontology and Genealogy of a New Practice", in *Architectural Design and Digital Technologies 2*.

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Description of illustrations

- fig.1: Jeremy Bentham, Panopticon, 18th century, plan and section drawings.
- fig.2: OMA, Kunsthal, Rotterdam, 1993, section drawing.
- fig.3: FOA, Yokohama Port Terminal, 2002, circulation diagram.
- fig.4: FOA, Yokohama Port Terminal, 2002, general view.
- fig.5: OMA, Seattle Library, 2004, zone areas.
- fig.6: OMA, Seattle Library, 2004, section drawing.
- fig.7: Wiel Arets architects, Utrecht University Library, 2004, interior space.
- fig.8: Wiel Arets architects, Utrecht University Library, 2004, section drawing.
- fig.9: BOLLES+WILSON, Luxor Theatre, Rotterdam, 2001, archetypical model of spire.
- fig.10: BOLLES+WILSON, Luxor Theatre, Rotterdam, 2001, section drawing.



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