Diagrams: Tropes, Tools, Abstract Machines

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Contents

Introducing Diagramming as Methodological Field

We might say that there are two sections through the world's substance: the longitudinal section of painting and the cross-section of certain pieces of graphic art. The longitudinal section seems representational; it somehow contains the objects. The cross-section seems symbolic; it contains signs (Benjamin [1917] 2003, 82).

An abstract machine in itself is not physical or corporeal, any more than it is semiotic; it is diagrammatic ... The diagrammatic or abstract machine does not function to represent, even something real, but rather constructs a real that is yet to come, a new type of reality (Deleuze and Guattari [1980] 1987, 141-42).
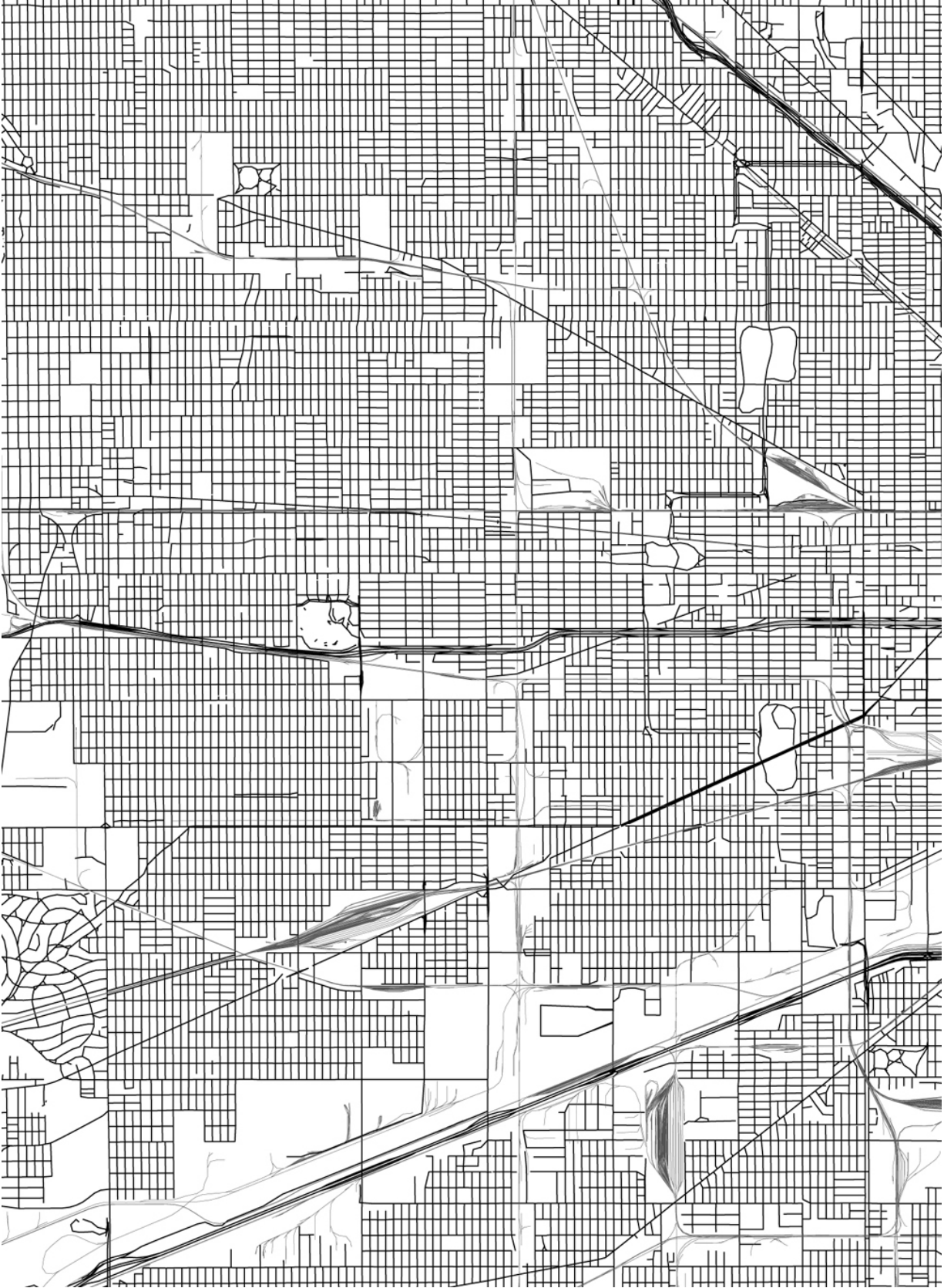
What is a diagram?

The quotes from Benjamin's essay fragment and Deleuze and Guattari's seminal book align diagrams with two diametrically opposed vectors of transposition. The first vector points from objects and processes observed in the world towards their notation and abstraction; the second vector points from abstraction towards actualisation and incorporation in the world. Hence, diagrams are tools of analysis as well as generative devices.

Diagrams are transparent as well as corporeal. The word *diagram* originated from two distinct Greek roots, firstly, *dia,* meaning *across, through,* and secondly, *graphein,* meaning to *write, draw, mark out with lines.* First, diagrams are transparent representations that enable us to look *through* their visual form, at a subject that they notate, abstract and explain. This is different to paintings or photographs that recreate the appearance of their subject on a flat surface. Second, diagrams are *marked out with lines,* inscribing the gestures of the diagram-maker into a receptive medium, such as sand or paper. Hence, diagrams are diaphanous abstractions as well as material inscriptions evocative of explanatory gestures and of human corporeality.

The term *diagram* entered the English language through the French term *diagramme.* Its earliest recorded use dates from 1613 and does not refer to architecture; it is used by a physicist in a treatise on magnetic bodies and motions (Ridley 1613, 126). Later in the 17th century, the term came to denote a list, register or enumeration (Weever 1631,8), a figure aiding in the proof of a mathematical proposition (Stone 1645, 74); and, in the 19th century, notation of a process (Robinson 1839, 157). In the late 20th century, the term acquired yet another meaning, as the French philosopher Deleuze argued for a redefinition of the *diagram* from "visual archive" to "display of the relations between

forces which constitute power" and "abstract machine" (Deleuze [1986] 1988, 36). Deleuze inferred this new meaning from Foucault's analysis of disciplinarian societies, but also from morphogenesis in geology, biology, thermodynamics and beyond (Deleuze and Guattari [1980] 1987). The evolutionary history of meanings and interpretations of the term *diagram* is one of translations between disciplines; architecture's participation in those transactions has progressively intensified over the course of the 20th century.

The multiplicity of disciplinary and historical tropes and trajectories, the flow of travel from conceptualisation to actualisation and vice versa, interact with further layers to constitute a complex methodological field, an unbounded fabric woven from specialist territories, interstices and overlays. This monograph assembles an array of deep probes into this paradoxical field, taken at key coordinates and intersections of ideas, practices and conven8 tions. Each probe—each monograph chapter— adopts a diagrammatic method as point of departure to retrace transactions between authors and commentators across disciplines, situate discourses and methods within cultural and disciplinary milieus, examine rapport with corporeality and embodied practices, map out analytical and speculative usages unlocking critical and inventive potentials.

Chapter one, on *Poché and Free Section,* explores the Beaux Arts notion of *poché* as a nexus between embodied thought, representational convention and inventive potential. Its literal translation from French is "pocket;" at the Ecole des Beaux Arts in Paris during the 19th century it denoted thick, sponge-like masonry walls that contained secondary spaces. The sectioned surface of such walls was hatched. At urban scale, *poché* manifests in the Nolli Map of Rome (1748, Figure 2), and diagrams relationships between public and private space. Since then, *poché* has been

appropriated and reinterpreted in different ways: Rowe conceived of it as the imprint on the ground of heavy walls and principle of tectonic poïesis, Kahn recognised a principle of spatial hierarchy, with servant spaces contained as voids in the *poché,* Venturi theorised *open poché* that exposes those voids as volumes; leading up to Koolhaas' radical reinterpretation, inverting *poché* from its early 20th century role as antagonist of the Corbusian *free plan* to protagonist of a newly theorised *free section.*

Chapter two, on *Analytical and Choreographic Notations* examines the *graphical method,* developed during the 1920s by the Russian/German/Israeli architect Alexander Klein, intended as a tool for the evaluation of architectural plans according to objective criteria. The long roots of this mathematical conception reach beyond Taylorism and scientifc management, beyond the scientific abstractions of the 17th century, all the way to Euclidean geometry; they have developed alongside competing notions of diagrams as emplaced and embodied in space and culture. While contemporaneous architects and theorists questioned the merits and methods of achieving objectivity, Klein's visually arresting and productively evocative diagrams concurrently elicited surprising alternative readings as choreographic notation (Löwitsch 1930a, 31). Abstract and corporeal readings of Klein's diagrams competed and co-evolved over a long arc of interpretations and transactions between disciplines that encompassed critiques of determinism (Evans 1978) alongside appropriations to new ideas and ideologies (Gloor 1970; Warhaftig 1985).

Chapter three, *Cardinal Transposition,* examines exchanges of ideas between artists, performers, composers, filmmakers and architects that strategically exploit the spatiality of canvas and screen, of upright figure and diagrammatic trace on the ground, of building section and landscape, of drafting table and framed view. Walter

Benjamin's juxtaposition of two sections through the world's substance reminds us that space is not isotrophic; we perceive a picture held vertically before us differently from a drawing laid out horizontally on a desk or a mosaic at our feet. Acts of *cardinal transposition* produce new meaning in exchanges between working and viewing surfaces and in transactions between disciplines and practices.

List might be the least suspected amongst the meanings that the term diagram has accrued. Chapter four, *Lists and Juxtapositions,* explores how lists operate as diagrams, as persistent tropes in literature, from Jorge Luis Borges' fictional *Chinese encyclopedia* (1942) to Georges Perec's lists and inventories (1974). Lists are adhoc collections or inventories in random sequence, that seek to be exhaustive while remaining open-ended; alphabetical lists such as dictionaries create new meaning through unexpected adjacencies and juxtapositions. *SMLXL,* authored by Koolhaas, Mau and OMA (1995), uses competing ordering systems and lists, alphabetical, scalar and temporal lists to weave together a methodological field of citations, references, literary genres and cultural languages. The chapter examines diagrammatic operations underpining the multi-vocal narratives and multi-focal layouts of *SMLXL's* book world and the homologous spaces of Koolhaas' architecture and urbanism.

Chapter five, on *Taxonomies and Typologies,* examines those contrasting systems of classification as diagrams used to generate architecture, beginning with the opposing positions of J.N.L. Durand and Gottfried Semper. Durand's methodology (1805) plays out on an abstract grid inviting the designer to freely combine architectural types and typological elements that thus are detached from their historical and cultural context. Semper's counterproposal sought a method of design modelled on biological evolution (1853, 261). His taxonomical tree situates artefacts in familial relationships to each other, analogous to the

evolution of species. Both of these competing generative diagrams, undergoing a series of reinterpretations have gained new relevance in the context of the early 21st century, manifest in the architectural practices of Forreign Office Architects (typology) and of WORKac (taxonomy). Drawing in the Deleuzian notion of diagrams as abstract machines, Manuel de Landa's concept of a genetic algorithm in architecture builds on Semper's taxonomy, and questions architects' agency within design methodologies and scenarios of allopoïesis and autopoïesis.

The final chapter, on *Rota and Network,* extends this exploration of poïesis into the realm of Utopian thought, to cosmopoïesis. While not annotated with diagrams, Thomas More's description of *Utopia* (1516) paraphrases contemporaneous worldviews embodied in rota diagrams. Notions of cyclical time, of hierarchical stratification between core and periphery are symbolised in a series of concentric circles evoking stability as well as rotational movement. The chapter contrasts *Utopia* against *Agronica* (1994), Andrea Branzi's project for a weak urbanism constituted by a pervasive network, explained through a three-dimensional model that simulates infinite space in a mirror-box. In each case, Utopian proposals articulate their authors' critique of an existing social, political and spatial system, while their use of culturally meaningful diagrammatic conventions, vitally interlinked with cosmography, reflects a prevailing world-view of their historical era.

publish this monograph and for his guidance and help in crafting it.

Poché and Free Section

The test of a first-rate intelligence is the ability to hold two opposed ideas in mind at the same time and still retain the ability to function (Fitzgerald 1936, 41).

Within a vast arsenal of architectural techniques employed by OMA in their first decade, poché occupies a unique position, for two reasons. First, unlike design techniques adopted from Surrealism, such as the paranoid-critical method or the cadavre exquis, or metaphors such as the medical term lobotomy, the concept of poché is drawn from the history of architecture. Second, while appropriation to architecture of techniques originating elsewhere figures prominently in Rem Koolhaas' theoretical output, the use of poché is never mentioned by Koolhaas or Zenghelis during OMA's first decade. Only in 1999 Koolhaas finally acknowledged "a fascinating condition to work for the first time with so-called poché" (Oswalt and Hollwich 1998, 12-22), on House Y2K and the Casa da Música in Porto, thereby denying the apparent role of poché in the *strategy of the void* for the new town of Melun-Senart (1987) and in the project for the Très Grande Bibliothèque (1989). OMA's ambiguous reception of poché during its first decade can be summarized as negation in writing alongside appropriation in design. It is as such a reaction to Robert Venturi's extrapolation of the Beaux-Arts conception of poché to urbanism; Koolhaas has described Venturi as both inspiration and threat (2004, 150). Koolhaas has acknowledged: "I think that for instance the historicists very legitimately have accused modernists of being stupid about many things. And I think that in that sense, on an almost pragmatic level, I would say, yes of course there is a lesson, because now it is possible to be a better modern architect, simply because of their critique. You can incorporate your critique in your own things" (Koolhaas 1983). Repudiation of Venturi's and Colin Rowe's contextualist definition of poché

acts as a polemic protective shield which allowed OMA to amalgamate poché with its tectonic antithesis, the free section.

Poché

In Beaux-Arts education, poché denoted the hatching or rendering in fields of colour of masonry that is sectioned in plan, which was applied to presentation drawings, but not to working drawings. Nevertheless, poché is as much a tectonic as it is a drawing convention, denoting load-bearing masonry construction which presumes space and structure to be congruent, in opposition to the free plan theorized by Le Corbusier in 1926. That same year, the Beaux-Arts theorist John F. Harbeson emphasized that "poché always encloses rooms" (1926, 188), which applied not only to the primary spaces bounded by walls, but also spaces contained within the hollow walls.

The theme of the "hollow wall" is a longstanding trope in the work of Koolhaas, beginning with the cells inserted into the walls of his 1972 thesis design at the Architectural Association, *Exodus* (Koolhaas 1977, 328-29), continuing with the 1974 *House in Miami* (Koolhaas and Spear 1977, 352), where "service areas such as pantry, powder room, bar and bathrooms are located within the thickness of the wall," and the *Story of the Pool* (Koolhaas 1977, 356), its basin bordered by two thick, hollow walls accommodating locker rooms. The dominant impulse of these early Koolhaasian walls is to divide rather than enclose space, betraying their derivation from Koolhaas' 1971 study *The Berlin Wall as Architecture* (Koolhaas 1995, 236). The early Koolhaasian walls act as radical disjunction, in opposition to Modernist orthodoxy postulating that "the inside should be expressed on the outside" (Venturi 1966, 70).

Urbanism and Contextualism

Robert Venturi, in Complexity and Contradiction, noted that "contradiction between the inside and the outside may manifest in an unattached lining which produces an additional space between the lining and the exterior wall," and that "the space left over by this contradiction was taken care of with poché" (1966, 70). In 1968 and 1972, Venturi and Denise Scott- Brown extrapolated the spatial conception of poché to the scale of the city; they observed that "Nolli's map of the mid-18th century ([Figure 2](#)) reveals the sensitive and complex connections between public and private space in Rome" (1968, 128). Their ideas were received with particular interest at Cornell University, by both Colin Rowe and by O.M. Ungers, with whom Koolhaas had in 1972 taken up studies. Following Venturi's line of thought, Rowe, in Collage City, defined poché at two scales. First, at urban scale "a building itself may become a type of poché, (…) a solid assisting the legibility of adjacent spaces," able "to engage or be engaged by adjacent voids, to act as both figure and ground" (1978, 79), and second, at the scale of building and façade, "ideal types" are adapted to and modified by "empirical context" (1978, 106) with poché acting as a technique of mediation.

   Koolhaas sharply distanced himself from Rowe's historicist tendencies and approaches, polemically deriding his "contextualist epiphany," and criticizing that "the modern contextualist is forced to telescope vicissitudes of centuries into a single moment of conception" (1980, 48). His position drew on his own book Delirious New York from 1978, where he recounted that, "frustrated by the irrelevance of the Beaux-Arts system to the new age, … in the deliberate discrepancy between container and contained New York's makers (of the early 20th century) discover an area of unprecedented freedom. They exploit and formalize it in the

architectural equivalent of a lobotomy - the surgical severance of the connection between the frontal lobes and the rest of the brain" (Koolhaas 1994, 100-101). Lobotomy eradicates the rationale for poché as a technique of arbitration between building and city. Instead, the façade makes a surgical cut; it thereby allows for volatile metropolitan cultures to be assimilated and intensified through spectacular orchestration of the interior, which is dissociated from, and thereby unencumbered by the enduring civic responsibilities of the exterior face. Koolhaas' polemic against a particular reading of the Nolli plan is qualified by appropriation of Nolli's drawing convention in the competition projects for the 1978 Dutch Parliament Extension (Zaero-Polo 1992, 46) and for the 1986 Hague City Hall (Buchanan 1987, 87). The site plan of the later project diagrammed, as voids rendered in white, public exterior spaces of streets, squares and parks, alongside the public interiors of churches, of the rail station, the Parliament, a theatre, department stores, and shops along the streets. However, imaginative travel through the public realm is sharply arrested upon reaching OMA's proposed City Hall; an abrupt shift to axonometric drawing convention conceals its public interiors. The *strategy of the void* OMA proposed in 1987 for the new town of Melun-Senart invests Nolli's opposition between solid and void (private and public) with new layers of meaning, namely indeterminacy and stability, renouncement and control, architecture and program. A system of voids is tasked to "preserve existing landscape," to ensure "beauty, serenity … beyond the possible architecture that will eventually emerge in between". The rationale for this postulated that "the built, 'the full,' is incontrollable – subjected to the maelstrom of political, financial and cultural forces – in a perpetual transformation" and speculated on the void as the new locus of "architectural certitudes" (Koolhaas 1989, 95). Progressively expanded in scale from wall to building to

urban field, poché transfigures from device of precise compositional calibration to placeholder for the incontrollable. Melun-Senart is a pivotal project; it is rooted in the diagram of Ungers and Koolhaas' 1977 Berlin as a Green Archipelago (Hertwek and Marot 2013), which proposes a process of eradication of superfluous built areas, thereby creating urban islands (read as figures) floating in a green landscape (read as void). The project for Melun-Senart would become the progenitor of a lineage extending to the McCormick Tribune Campus Center at the IIT in Chicago (1997-2003), whose reference to Georges-Eugène Haussmann further elaborated the terms of poché as the residuum of erasure (Oswalt and Hollwich 1998, 14). The plan diagram juxtaposes islands of cellular building texture (poché), the rhythms of their subdivision determined by programmatic requirements, against a choreographed system of avenues (voids) notionally subtracted from the dense cellular field, which thus is made navigable and transpicuous.
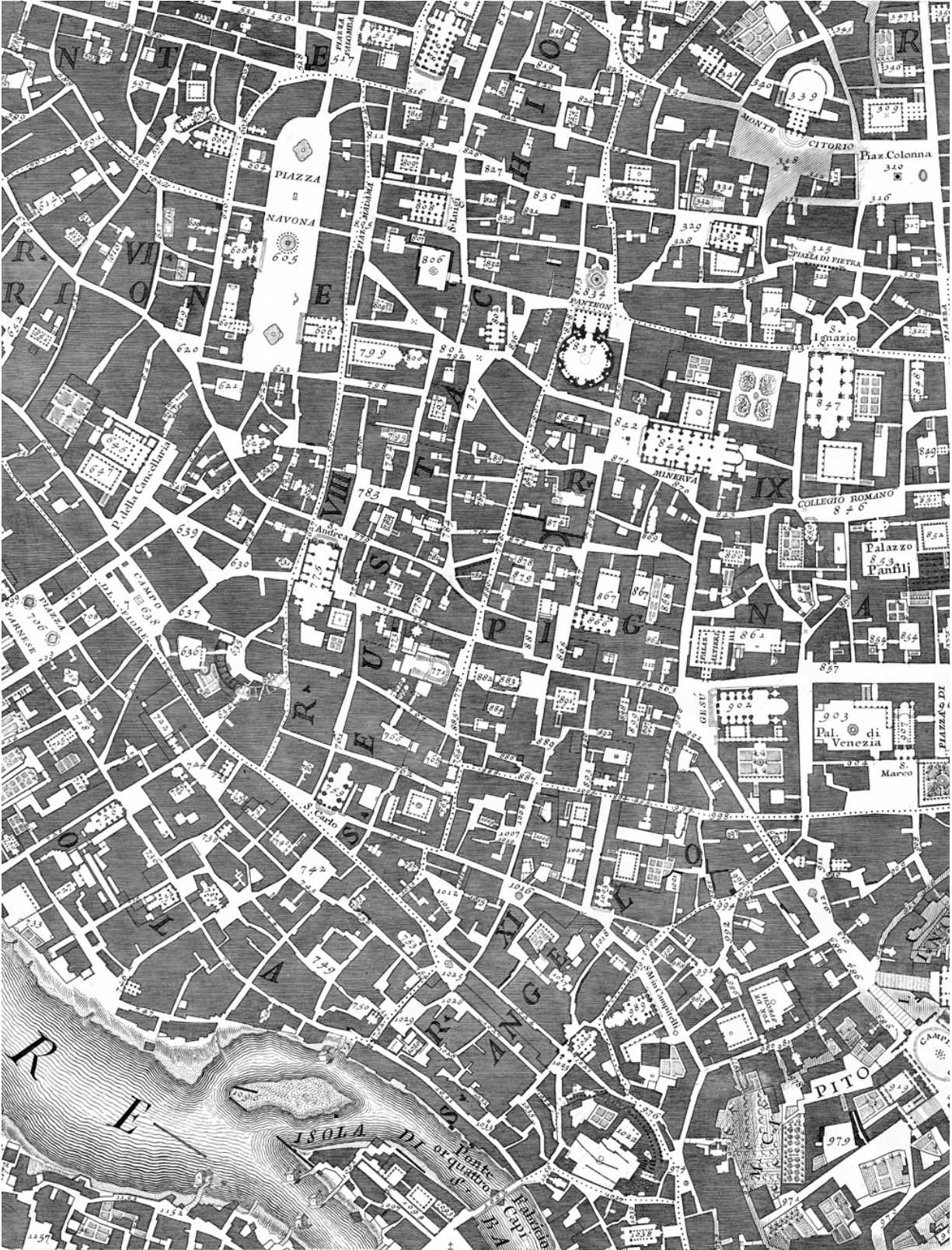
Fig. 2: Giambattista Nolli, Pianta Grande di Roma, 1748.

Fig. 3: OMA, Site plan for The Hague City Hall, 1986. Copyright OMA.

Poché and Free Section

While this urban, "horizontal" conception of poché retained Beaux-Arts privileging of the plan as generator, OMA's projects for the Très Grande Bibliothèque de Paris (1989) and for the ZKM in Karlsruhe (begun 1989) reconceptualised poché in terms of a "free section." The TGB, the project text reads, is conceived of as a "solid block of information, a repository of all forms of memory, books, optic discs, microfiches, computers;" the major spaces then are generated "by scooping out forms from a solid block, like ice cream" (Koolhaas 2004, 77). This "sculptural" conception is prefigured in Luigi Moretti's volumetric plaster models of voids (Figure 4), which make visible and explain spatial structure and sequences of spaces in a series of Roman, Renaissance, and Baroque buildings and unrealised projects (Moretti 1952, 9-20; 1953, 107-8). The transitions between "elementary volumes," via interspaces, linear passages, or through volumetric fusion, that Moretti visualized and catalogued had been shaped by the use of poché; by not

representing the poché, Moretti's three-dimensional diagrams evoked a previously unseen, sculptural notation of space. This notation resurfaces in a model of the TGB that, like Moretti, represents the voids as solids. While Beaux-Arts notions of poché did also "ascribe to the space of the room the physical power to eat into – to pocket – the wall," and posited space as a "positive force, causing the passive masses of the walls to yield before it as it balloons up to form sequences of volumes" (van Zanten 1978, 72). The tectonic principles of masonry construction meant that the primary interiors had to be aligned vertically. Koolhaas' new, "isomorphic" notion of poché breaks with the tectonic understanding of poché as "the imprint upon the plan of the traditional heavy structure" (Rowe and Koetter 1978, 78), to —as the project description goes—"introduce a new era of liberated and randomized relationships between the different components of a building," which are compared to "multiple embryos, each with their own technological placenta." This idea resonates with Bernhard Hoesli's translator's note to the German translation of Collage City: "'Pocher' would then be the packaging or the surrounding of an (ideal) form with tissue. Poché in plan, section or urban plan would denote 'packaging,' connective tissue or supporting tissue" (Hoesli 1984, 114). Rather than forming "connective tissue" that articulates transitions between spaces, poché internalises Koolhaas' conception of lobotomy by disengaging the major interiors. In the TGB, relationships are left to be established mechanically rather than architecturally, as a grid of 9 elevators connects the voids. Begun at the very end of OMA's first decade, the project for the ZKM in Karlsruhe continued the specification of a new tectonics of poché prompted by the free section. Servant spaces are accommodated in horizontal layers supported by Vierendeel beams, interspersed between the served spaces thus kept free of columns.