

Proceedings

Multiple Images

Notes on Graphic Cataloguing [†]

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Abstract: This article offers a critical interpretation of the historical and contemporary context underlying the purposes and the methods associated with the organisation of data and information in the various fields of knowledge by means of graphical classification. Essentially, the act of listing and enumeration allows the simultaneous exploration of different possibilities; it offers a privileged view of the world and facilitates effective problem solving. Graphical classification enhances the organisation of knowledge in a systematic and scientific manner, suggesting the logical inferences from which conjectures and theories may be formulated. It therefore constitutes an irreplaceable aid in the exercise of thought.

Keywords: imagination; representation; graphical cataloguing; list; repetition; multiplicity

1. Vision and Imagination

In an image-conscious society, the term “vision” recalls and evokes a multitude of diverse meanings. Vision is the physiological process by which an organism reacts to luminous stimuli and perceives an image of a certain portion of observed space; in humans, as in other animal species, this process involves the coordinated use of both eyes, resulting in the phenomenon of binocular vision. Diversely, vision is the term we use for that fantastic, generally unrealistic image that an individual may perceive under singular physical and psychological conditions (for example, states of deep concentration or alteration induced by drugs or hallucinogenic substances). It is frequently associated with situations of partial consciousness such as sleep or trance, and it can assume the connotation of supernatural or mystical visual experience. Finally, vision is the structured idea that people elaborate in association with phenomena that are observed or perceived through one or more senses. In this sense, it is a way of thinking, a held position on a certain theme—of scientific, ideological, or cultural portent—initially formed and subsequently consolidated, of which composite features are known and detailed information is also available.

While sharing a common perceptive mechanism, these definitions cater not only for images grounded in reality (such as those produced on the retina during the physiological processes that ultimately determines cerebral vision), but, above all, they dwell on such mental images that may be, in part or entirely, disconnected from reality itself as they “materialise” in the form of complex thoughts or “visual illusions”. Since the dawn of civilisation, philosophy has questioned these aspects, formulating a clear distinction between perception and imagination while expounding theories that move from Aristotelian psychology (where imagination is considered as the ability to produce perceptible images with or without reference to real objects), to the reflections of Immanuel Kant [1], wherein he introduced and declined imagination as ‘productive’ (with spontaneous formation of images of objects never perceived by the senses) and ‘reproductive’ (where images are formed by empirical association). Indeed, the human mind does not simply record objective data (or

sets of data) but uses it to trigger the imaginative process, i.e., the ability to represent “beyond” sensorial experience (according to Gaston Bachelard’s structuralist conception, imagination is not the ability to form images from real sensorial perception, but the ability to “deform” those images generated by sensorial perception by creating a new and original vision [2]). This aspect is closely related to that instinctive drive which distinguishes the human species and causes us to deduce information from observed things, thus evolving individual mindsets as we delineate and progressively assemble our behavioural codes. In conclusion, “vision” can take on a final meaning which can add a further layer of understanding: vision is also predictive projection, the ability to see further into the future, which may arise from exercising intuition or may evolve from wisdom and conviction fostered by experience.

2. Seeing Simultaneously

Vision and imagination have always found practical expression in figurative depiction—the art of drawing—which humankind has been using since antiquity to materially record events, processes and objective perceptions. The evolution of cognitive skills rooted in observed reality may be broken down into the stages of analysis, abstraction and synthesis, which find their irreplaceable instrument in the act of representation, a harbinger of otherwise inaccessible imaginative possibilities. Frequently, and this is the aspect we shall address in depth in this study, drawing is also used as a tool for the organisation of knowledge in a clear and comprehensible manner, classifying its diversity in visual form in order to encourage the further elaboration of thoughts and theories. In such cases, thorough and accurate observation is followed by a classification exercise in the manner and situations with which reality presents or announces itself.

It is not merely a matter of seeing and depicting a (more or less abstract) scheme relating a particular observational experience; rather, it is a question of seeing the “whole”, capturing a synoptic view of multiple phenomena or diverse aspects of a single manifest event. This ambition to pursue simultaneity in vision, which can be observed in many scientific and artistic fields, may perhaps be attributed to the *primaeval* urge to exercise dominion over the world, in a manner that is almost detached from the earthly dimension and yet extremely concrete. Certainly, the act of representation (as well as the arts directly related to it, such as painting) allows for an effective “simultaneous” overview, in many ways comparable to the conscious perception of dynamic action, since the inevitably sequential rhythm of the passage of time (for example, as in a musical composition) has the power to counteract the simultaneous view of several aspects of an individual object [3] (p. 44). It is no coincidence that this theory is well exemplified by Cubist thought, which inspires works that freeze various alternative images of a moving subject, with the intent of simultaneous vision: rigid patterns of descriptive geometry are shattered in favour of a multiplicity of prospects that capture the “totality” of the observed scene.

In this perspective, we propose an analysis which we trust shall be useful (albeit partial and subject to generalist tendencies), based on examinations of some significant examples in an attempt to critically assess the reasons, the purposes and the approaches relating to the historical and contemporary practice of organising homogeneous and heterogeneous content through graphic enumeration. In particular, we shall see how various contexts of thought, where we can recognise a concentration on “simultaneous vision”, can be elaborated and achieved through listing. We shall refer to two studies that have investigated the phenomenon of classification practice, primarily in literary terms and from various points of view: the “multiplicity” identified by Italo Calvino as a fundamental inspiring theme for the novel of the third millennium [4] and the “vertigo of the list” whose enchanting power has been extolled and structured by Umberto Eco not only from an anthology of historical and recent texts, but also from a review of examples that mark the history of art, from our origins to the present day [5].

The act of listing and classification ensures the simultaneous exploration of various possibilities, it offers a more all-encompassing (and therefore more privileged) view of the world and allows for problems to be rapidly solved: classification means organising knowledge in a systematic and scientific way, suggesting logical inferences which will allow us to theorise on a given question. If a

list or classification is drawn in graphic form, it becomes an even more effective aid; we frequently call on the evocative power of depiction or representation once the basis for an original theory or an innovative vision of natural phenomena has been laid down. The usefulness of classification practice in popular culture is testified by the linguistic richness with which it can be described and the vast extension of terms that we can invoke to describe the diverse organisation of data and facts: abacus, archive, atlas, catalogue, collection, inventory, list, repertoire, repository, samples, schedule and many more.

3. Controlling Space and Time

The geometric control of space is probably the primaevial aspiration of humankind on which every science is based. Striving to know our location in the infinite extent of the universe, trying to measure (and thus to quantify) the distances and times that separate objects and events—these were the efforts that led to the acquisition of the earliest rudiments of geometry, aimed at the scientific rationalisation of a context which remained largely unknowable. The idea of a modular space, saturated with an infinitely wide array of elementary and perfectly superimposed notions, has accompanied our vision of the world since the establishment of Euclidean geometry. Mathematical and physical laws are based on the model of a three-dimensional space in which geometric entities are physically or ideally located and through which we rationally explain the movement of bodies and the forces to which they are subject. To this mental image of extreme geometric rigour, which incessantly accumulates intangible spatial units through repeated listing, we can match the elaboration of continuous textures such as the tessellation of the plane and space, infinite possibilities with which surfaces or volumes can be saturated by the repetition of identical forms, arranged in an obsessively ritual order. The theme is widely established in architecture, from the opulent modular decorations that adorn monumental Islamic complexes, to the exquisite examples of Italian Cosmati art (Figure 1a). Recent examples include “intelligent” building structures that can change their configuration in response to varying environmental conditions: continuous surface coatings deform, bend and ripple as they adapt to external factors and redefine, moment by moment, their own image and the shape of the building to which they are applied [6]. In the realm of art, the figure of Maurits Cornelis Escher stands out among the most prolific masters in the exploration-decomposition of the impenetrable infinite. He devoted his research to the theme of the circularity of nature and time, creating a vast collection of works that invoke spatial impossibility and multiple paths of optical illusion and metamorphosis (Figure 1b), in which the replication of simultaneously perceivable forms ascends to an expressive language as they ultimately evolve.

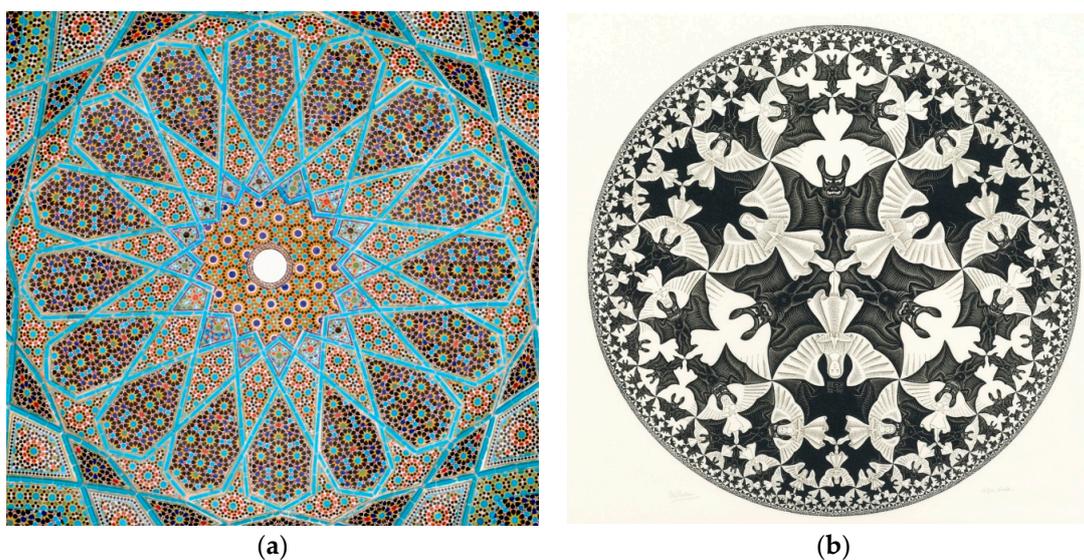


Figure 1. (a) Tomb of Hafez, Iran; (b) Escher, M.C. *Himmel und Hölle*, 1960.

The attempt to “tame” space and time by pursuing their representation as a sequence of elementary units of finite size (hence easily controllable) is spontaneously identified with the compulsion to draft lists, initially in written form and later, as graphic objects. While the earliest forms of geographic representation comprised endless lists of placenames encountered along a journey [7], the subsequent millennial evolution of maps presents a path that extends from extremely abstract lists of words, passes through the scientific research of metric-proportional correspondence achieved by the “modern” geographic maps introduced by Mercator, to arrive at the current iconicity of territorial satellite photography—all the while without ever losing its connotation as an organised inventory of the observable. And also the practice of chronology, from which historical studies originate and find graphical expression in primitive *timelines*, is nothing but the sequential sorting of events and facts that would otherwise be confused, so that we may more easily perceive everything at once.

4. Classificating Knowledge

Historically, the generalised ordering of knowledge has been a fundamental human practice, whether for the mere purpose of “archiving” or for the predisposition of data to facilitate logical deduction in view of a subsequent elaboration of theories and interpretations. Simultaneous figures and diagrams have invariably accompanied the recording of observations of natural phenomena and daily events—just think of the earliest forms of Paleolithic cave art. However, this practice consolidates and becomes systematic with the advancement of knowledge and study: simultaneous representation becomes an indispensable visual aid to the coherent formulation of logical and scientific thought. For example, astronomical research, based on the repeated observation and recording of stellar phenomena, uses images conceived as diagrammatical series, in which the comparison between the positions of the stars and their characteristics attempts to uncover the laws governing their motion (aside from their scientific validity, an eloquent example is provided by the graphical sun spot charts drafted by Christoph Scheiner in his scientific treatise *Rosa Ursina* [8], Figure 2a). Similarly, the studies of naturalists have always relied on the direct verbal and graphical recording of observations. From Linnaeus to Darwin, charts derived from systematic analyses were sketched on margins of diaries and notebooks, confirming the effectiveness of simultaneous observations for deductive purposes. We then have the autotypic prints of Ernst Heinrich Haeckel at the beginning of the 20th century. These are included in the work *Kunstformen der Natur* [9], in which the naturalist catalogued several hitherto unknown living organisms (Figure 2b).

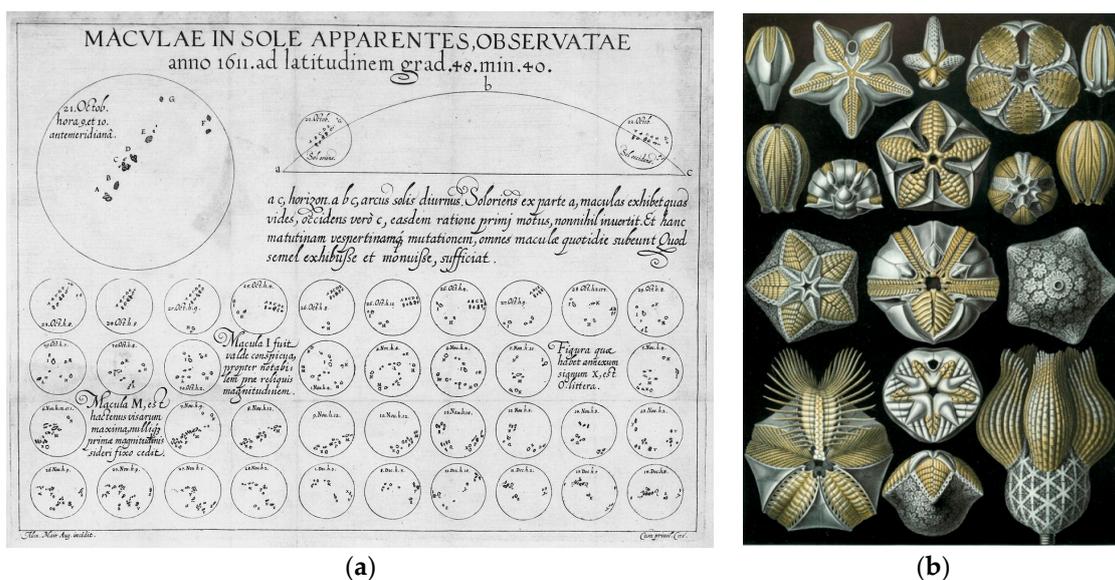


Figure 2. (a) Scheiner, C. *Rosa Ursina*, 1626–1630; (b) Haeckel, H. *Kunstformen der Natur*, 1904, plate 80.

Haeckel is also the author of the first phylogenetic tree [10] by means of which a single synoptic diagram aggregates multiple families of living organisms. He also championed the “recapitulation theory” which attempted to comprehensively formalise the history of the evolutionary process. The tree model derived directly from traditional practice; inspired by the representations of trees of life present in the history of art since ancient civilisations, later in the Middle Ages, it was to give rise to the birth and development of heraldry. By way of affinity, also genealogical trees (for example, those widely used in episcopal genealogy) constitute one of the most popular “simultaneous” representational methods that have survived to modern times. They allow us to readily understand relationships between individuals of the same family or related by acquired lineage [11]. We also have the example of how visual abacuses of characteristics and phenomena formed the basis of modern criminology, although the early theories are now completely discredited. As we know, Cesare Lombroso extrapolated the foundations of criminal anthropology from a vast series of photographic, anthropometric and anatomical comparisons conducted by systematically studying the somatic traits of “delinquent man” [12] and accumulating clues that indicated “anomalous” genetic heritage (Figure 3).



Figure 3. (a,b) Argumentative photographic comparisons of Lombroso’s theory.

In a more strictly architectural context, the compilation of thematic literature consisting of systematic collection in the form of a unified compendia of the compositional, stylistic and constructive instruments of a given historical age, notwithstanding its objective or tendentious nature, fully corresponds to the orderly codification of lexical possibilities and implementation methods, at once valid as a shared knowledge encyclopedia and as a catalogue of design-related opportunities. Many catalogue works fit this mould: from Villard de Honnecourt’s travel journals [13] to Sebastiano Serlio’s thematic tables [14] and the typological abacuses of Jean-Nicolas-Louis Durand [15], they are elevated to the level of creative handbooks that may be reused according to specific circumstances. Then again, the desire to classify knowledge by organising it into a

structured collection of scientific data is rooted in the Middle Ages. We recall the almanack, a publication initially born as a practical tool for the perpetual determination of the days of the week depending on the year, and that later developed into a handbook full of information and practical suggestions [16]. Then there were the bestiaries, a literary genre that reached its apex precisely during this historical period; they embodied the dreams, virtues, mysteries and fears of humankind in a collective format [17]. Prime examples are the 16th and 17th century *Wunderkammer* [18] (Figure 4a), typical expressions of accomplished scientific thinking as it evolved during the enlightenment, they fostered a remarkable legacy of simultaneous representation united by the same cataloguing spirit. But it is evident that the passion for encyclopaedic cataloguing of universal knowledge applies to all spheres of cultural endeavour, the phenomenon expanded continuously and became universal. The classical reference in this context and forerunner of the acclaimed Diderot and D'Alembert *Encyclopédie* is the *Cyclopaedia*, which Ephraim Chambers printed in four volumes in 1728 [19] (Figure 4b). In the style of a manual, it is an ordered collection of all human knowledge of the time and was intended to be "within reach of all". The ready convenience of these cultural tools was destined to create critically important added value. Firstly, pocket handbooks on astronomy and geometry spread rapidly as travel became popular among the wealthy classes. They allowed for practical confrontation with natural phenomena; with trigonometrical and astronomical tables and graphs, they predicted tides in relation to lunar cycles as well as aiding the charting of courses and astronomical orientation.

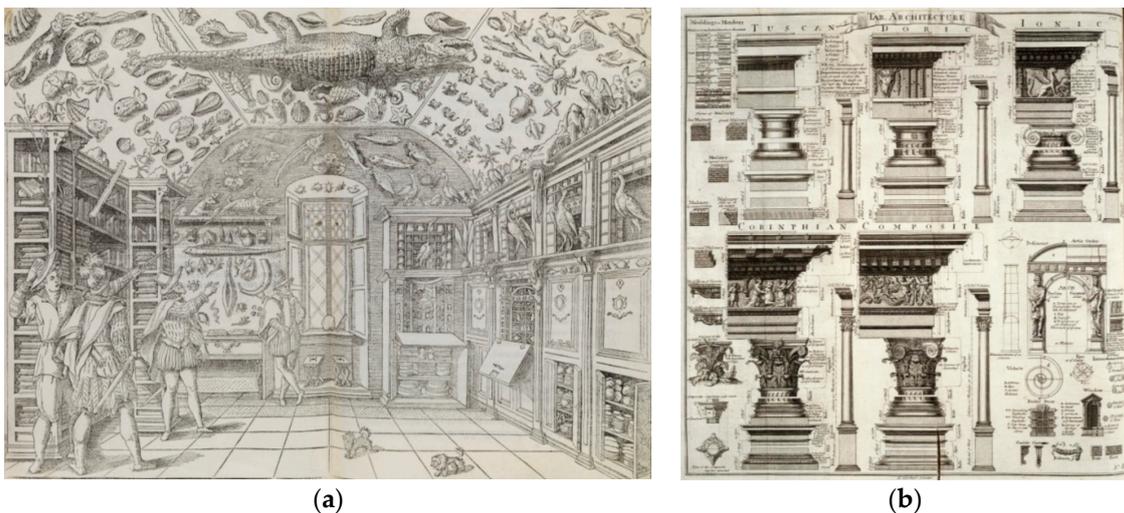


Figure 4. (a) Imperato, F. *Dell'istoria naturale*, 1599, *Wunderkammer*; (b) Chambers, E. *Cyclopaedia*, 1728, orders of architecture.

But the urge to catalogue and classify affected the most diverse contexts. During the Renaissance, the sacred and the profane merged in the tradition of games such as tarots, which from the 17th century took on magical and divinatory connotations: from a list of symbols of characters and virtues, they evolved into *look-up* prospect guides to be consulted as required. Keeping faith with tradition of games (Figure 5a), instead, the venerable *Laberinto* was developed by the noble Venetian Andrea Ghisi [20]. It consists of a series of 21 abacuses, each consisting of the same 60 symbolic images that are recombined in different sequences: if the player chooses any figure, three questions are sufficient to reveal it with certainty. In chemistry, the study of matter and its alterations by changing its properties and characteristics has its origin in ancient alchemy tables. These symbolic syntheses of the esoteric urge to transform substances into gold evolved into remarkably rational synoptic representations in the modern age, finally taking the form of the periodic table of the elements as we know it today, conceived of by Dmitry Ivanovič Mendeleev in 1869. In art history, the collector's reasoning is emblematically exemplified by the figurative atlas *Mnemosyne* composed by Aby Warburg as his last creative endeavour (Figure 5b). The atlas consists of a large number of images that refer to different historical periods and are synoptically grouped by

themes (corresponding to as many lectures). Following a long gestation period, the visual catalogue, in its unfinished state, was first reorganised and subsequently, after a period of oblivion, restored to life thanks to publication [21].

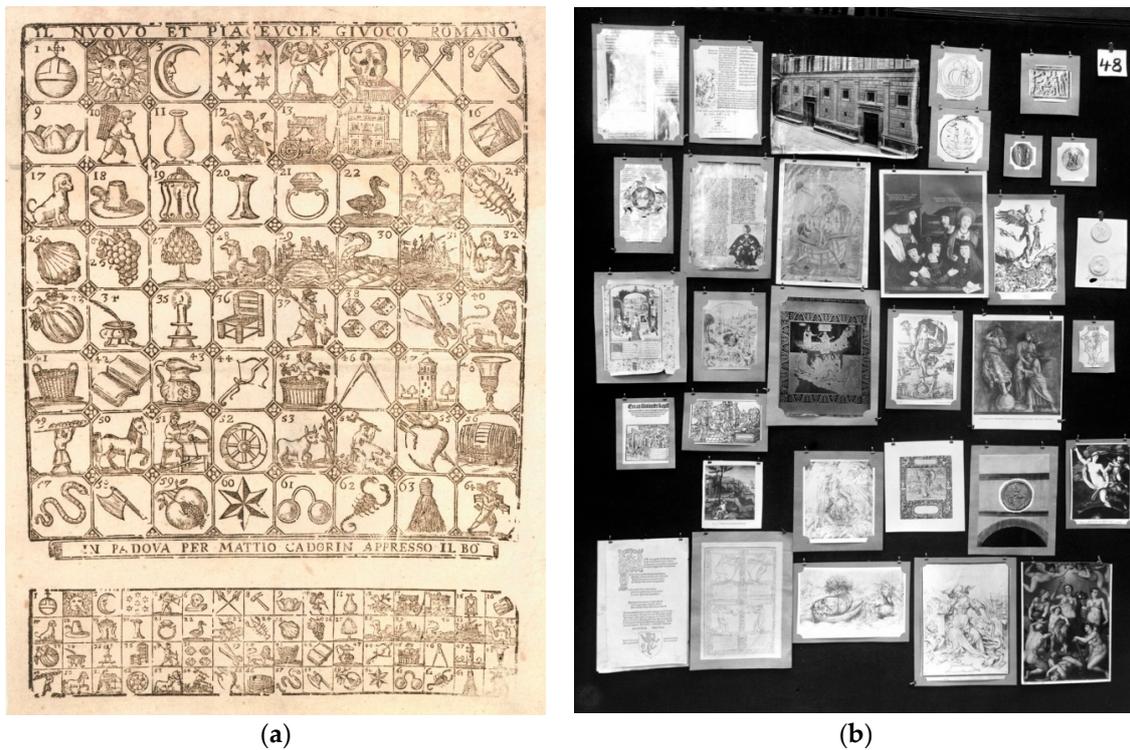


Figure 5. (a) Game of *Biribissi*, XVII secolo; (b) Warburg, A. *Mnemosyne*, 1924–1929, Table 48.

5. Sustaining Effectiveness

Synoptic charts and diagrams are valuable tools also thanks to their operational effectiveness, which simplifies assessments and subsequent decisions. In this context, the legacy of encyclopaedic cataloguing has been taken up by the concept of the manual, which allows various options to be rapidly and simultaneously consulted and developed into a range of alternative design undertakings. In typography, one of the synoptic representations that best exemplifies this concept is the *specimen* [22], a collection of glyphs available for a certain typographical character that synthesises its stylistic qualities, design and performance, rendering an immediate perception of its suitability. Composed with remarkable aesthetic care and even artistic intent at times, specimens are formidable visual catalogues that showcase the forms and typographical effectiveness of a font and in which visual synthesis enhances practicality of use. From the dawn of printing to the present day, this tool, in addition to serving internal technical purposes, has also played a role in the interface between the typographer and the beneficiary of the published work, akin to a modern company’s product catalogue. Remaining in this area, a well-known synoptic tool designed to facilitate typographic composition (now fallen into disuse) is the typographer’s case, where neatly ordered individual “types” were stored. Great importance was vested in these operational aids, also in terms of their design; indeed, in the past, they were frequently the subject of design competitions which attracted popular participation [23].

But it is in the conceptual phase of architectural design that the ordered arrangement of compositional possibilities (in effect—design options) is commonly practised: much acclaimed in this sense are the sketches by means of which Louis Kahn explores the possible implications of a technological solution or juxtaposition between volumes or the location of an opening in a wall. A serial design approach facilitates the comparison between various hypotheses, allowing for the best alternative to be chosen. It also aids the design thought process, which is expressed through partial or integral variations of a composition. Finally, we can draft theoretical formulations leading

to the generalisation of a method or process. For example, the systematic photographic cataloguing of industrial buildings undertaken by the German couple Berndt and Hilla Becker [24], in which silos, tanks, chimneys and barns become silent protagonists of an almost surreal landscape, has brought widespread attention to the heritage significance of historical industrial assets (Figure 6a); this brought about the firm establishment of industrial archaeology as a discipline in itself and *effectively* promulgated concrete actions promoting the enhancement of their value. And it is rigorously through the fragmentation of architecture into elementary parts that Aldo Rossi converges to the formulation of the theory of the “Analogical City”, formalising the logical sequence that initially decomposes, then orders, and finally re-composes. The creative dimension of the catalogue-representation can then spill over into the *divertissement*, an approach which has frequently driven revolutionary methodological ideas and innovative critical positions. Thus we have the radicality of the *Istogrammi di architettura* (Histograms of Architecture) through which Superstudio reduces space to an isotropy, endorsing the designer’s complete compositional freedom; the rigour of the typological solutions by which Franco Purini classifies spatial possibilities, coding criteria and solutions on which to draw in design practice; the self-referencing conceptual schemes by which Peter Eisenman implements the alienation of the form, provoking its total semantic autonomy (Figure 6b); the obsessive tensile structures through which Frei Otto experiments with infinite declinations on the same functional scheme, hybridising design with combinatorial computation and anticipating the parametric drift of the architectural form. Furthermore, the usefulness of the typological abacus has been effectively exhibited at the 14. *Mostra Internazionale di Architettura* (14th Venice International Architecture Exhibition) in the Central Pavilion [25], where the layout the architectural lexical units of are framed as a series of organised lists broken down by homogeneous categories, with the aim of analytically redefining the typological elements underpinning the design by freezing the instant preceding the spatial composition.

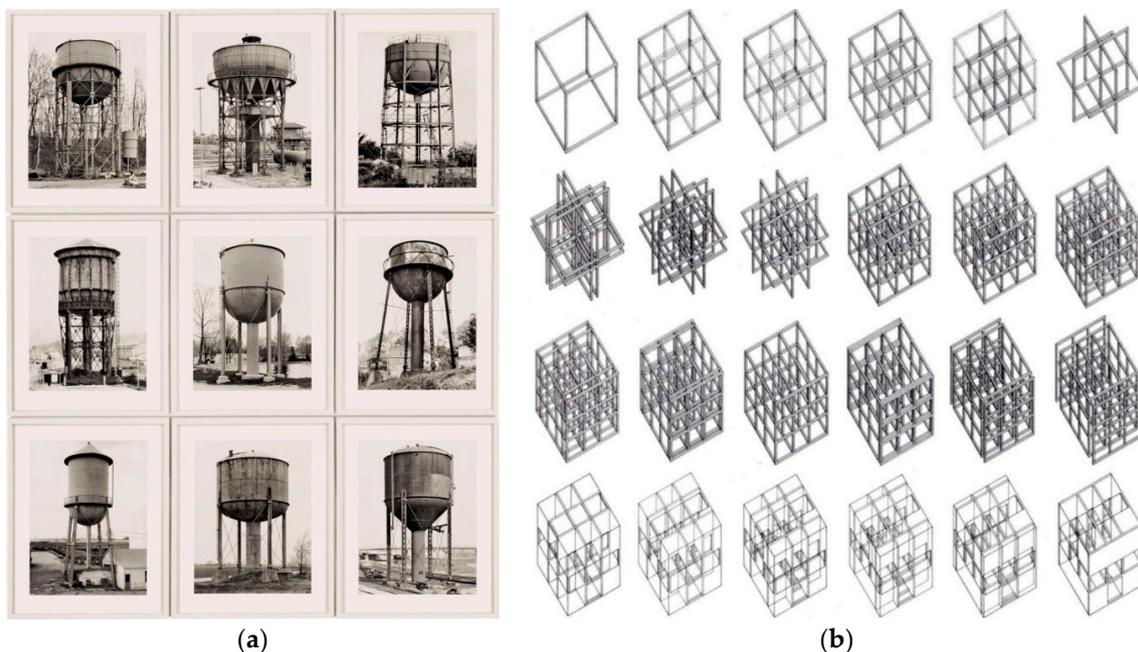


Figure 6. (a) Becher, B.; Becher, H. *Typologien industrieller Bauten*, 2003; (b) Peter Eisenman’s diagram.

6. Beyond the List

The power of listing and classification can be even more disruptive when identical replication replaces enumeration; thus variation is cancelled in favour of the assertion of the “mere” value of the series over the single element. It is no coincidence that, from the work of Andy Warhol onwards (Figure 7a), the opening act of the pop art era, the history of art has witnessed the aesthetics of repetition as it evolved in several directions. A case in point are Ai Weiwei’s provocations: bicycles, crabs, seeds, chairs are strewn in untidy heaps or rigorously and maniacally ordered, as they

converge to a “collective essence” and become linguistic elements of incomparable expressive power. In a number of fields, representation by means of abacuses is now a cardinal tool and has been broadly accepted in this sense: just think of infographics and the use of the *small multiple* series (which presents comparisons of multiple diagrams constructed using the same variables) or *scatter plot* matrices (for the inference of correlations between variables). Indeed, we regularly experience the usefulness of cataloguing (often unconsciously) when we search for images on a theme or subject: at a glance, we opt for the image that best suits our needs, by virtue of the power of immediate simultaneous comparison. Similarly, a number of social networks (Pinterest above all) are based on collections of images that are similar from a conceptual, typological or merely visual point of view. The bulletin board has now become the reference synoptic tool used to inspire and define new orientations of taste, to affirm our social affiliation or simply to arrange points of interest and curiosity. The scientific use of visual simultaneity coexists with the fresh and friendly approach that fosters the formation of consensus in contemporary society; on the one hand, unveiling to the general public a historically inaccessible representational mode, while on the other hand, inducing a significant devaluation of the usefulness of the list [26]. Inspired by illustrious catalogue works such as Pliny’s *Historia Naturalis*, Ovid’s *Metamorphosis* or Dante’s *Commedia*, writers of the calibre of Raymond Queneau [27], Italo Calvino [28] and Georges Perec [29] have laid down precise mathematical rules on which to articulate a stylistic discourse based on multiplicity, aimed at exploring the depths of linguistic matter. Today, far from that precision, we can say that literature, art and visibility are universally nourished by the lifeblood of simultaneous representations in their virtuous practice of visual figuration [30] (p. 326). As long as we do not fall into the trap epitomised by the Borges library [31] (Figure 7b) and well exemplified by the work *Cent mille milliards de poèmes*, in which Queneau [32], by means of modular pages, compiles an enormous number of poems, actually finite, but impossible to read, even by dedicating an entire lifetime. In any case, it would be impossible for all combinations to make poetic sense: entrusting the literary composition of a novel or, by analogy, the graphic composition of a design to mathematical logic, generates a conceptual paradox that can be resolved only through the conscientious use of representative resources.

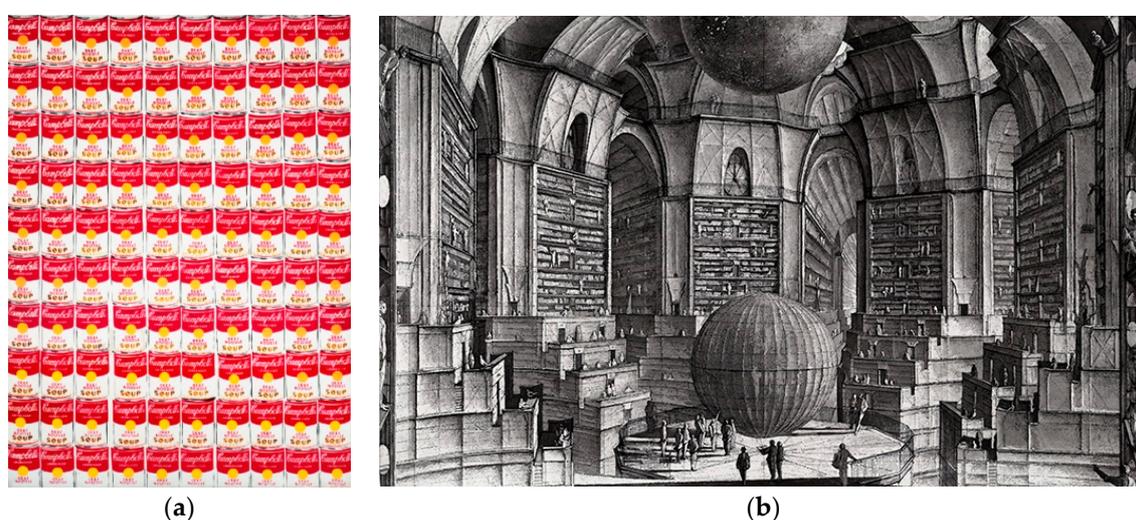


Figure 7. (a) Warhol, A. 100 Cans, 1962; (b) Desmazières, É. La Salle des planètes, En Onze estampes inspirées de la nouvelle de Jorge-Luis Borges La Biblioteca de Babel, 1998, Planche5.

Conflicts of Interest: The author declares no conflict of interest.

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