SEEING, FEELING, AND HEARING TIME
EXTENSIONS OF REPRESENTATION BETWEEN DIAGRAMS AND FIGURES

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REPRESENTATION
TIME
DIAGRAM
FIGURE

This essay proposes reflections on the figural and diagrammatic extent of representation, adopting for the purpose a particular 'object', i.e. time and temporality. This 'object' cannot be detected by our senses, but we 'feel' it so convincingly that we imagine a space in which things and events are immersed in time, in its flowing. It drags on to the future according to a temporality that can be regulated by the rigour of the principle of causality, or the probable relationship between beginning and end, or it advances only to return inexorably and cyclically back to itself.

This essay therefore serves as an opportunity to progress along some of the many paths of representation and to observe and verify some possible extensions, reflecting on certain evidence from reasoning, different 'excellent' representations, or even teaching experiences.
While only partial, these reflections aim to underline how a representation always and contextually acts according to two the registers of diagram and figure. According to these acceptations therefore, a representation is not only a 'machine for presenting' but also a 'machine for thinking' and what is more, a 'machine for imagining'.

INTRODUCTION

"*Representing* is a transitive verb which demands an object" (Gombrich, 1985, p. 215). But what are the possible modulations of this object? And, likewise, what is the extent of representation?

This serves as the starting point of this essay, which proposes reflections on the extent of figural and diagrammatic representation, adopting a particular 'object', i.e. time and temporality. We cannot detect this 'object' with our senses, but we 'feel' it so convincingly that we imagine that the real world "is really a world of bodily objects immersed in a space where time flows" (Bellone, 2005, p. 14).

This feeling of time comes in different variations and therefore needs an equal number of representations as indispensable means to conceptualize and perceive it, that is, imagine it.

In this essay, retracing some of these variations and corresponding configurations serves as an opportunity to explore different registers of representation and, in particular, the background of the eternal juxtaposition of paradigmatic thought and narrative thought. These means of thought, irreducible and complementary, seem to necessarily oppose not only logic and aesthetics, science and art, but also reading and seeing, that is, writing and images. This applies even more specifically to alphabetic writing –verb-centric and sound-dependent, indispensably supported by a linear spatial structure– and graphical and metasemiotic writing, which, through a variable topological organization that is reconfigured from time to time, integrates signs and symbols, schemas and icons, diagrams and figures.

Still today these juxtapositions are proposed when instead, the relevance and expansion of representation, whether diagrammatic or figural, is evident, particularly in communication and scientific, political, and economic publications. Such expansion is due to the efficiency demonstrated in managing a huge amount of data and the ability to penetrate increasingly specific situations. More in general, however, this

efficiency has always been shown in different fields of knowledge arising from 'vision' –therefore also from diagrammatic and figural representation– due to the possibility of reducing, ordering, and depicting the complexity of the world, both visible and invisible, making it perceptively intelligible.

As mentioned above, the reflections in this essay are made by pausing on some of the variations and corresponding configurations assumed by the object 'time'. For this purpose, the considerations propose different 'excellent' representations as evidence of the reasoning, using the conclusions to the different sections to note some teaching experiences made over the years with students in Architecture and Design courses at the Sapienza University.

The representations are more or less excellent, therefore, but they all seem to demonstrate the extent and power of thought and visual knowledge. In fact, by assigning a spatial disposition to the 'objects' through the 'page layout', representations confer order and therefore coherence on the entire system by virtue of contextual pressure (Eco, 2009, p. 116). "Putting [something] in a particular place that is meaningful [...] in a sense more radical, consists in giving a place [and] 'giving a place' means conferring existence. Making the object of representation exist, or rather, making it happen,

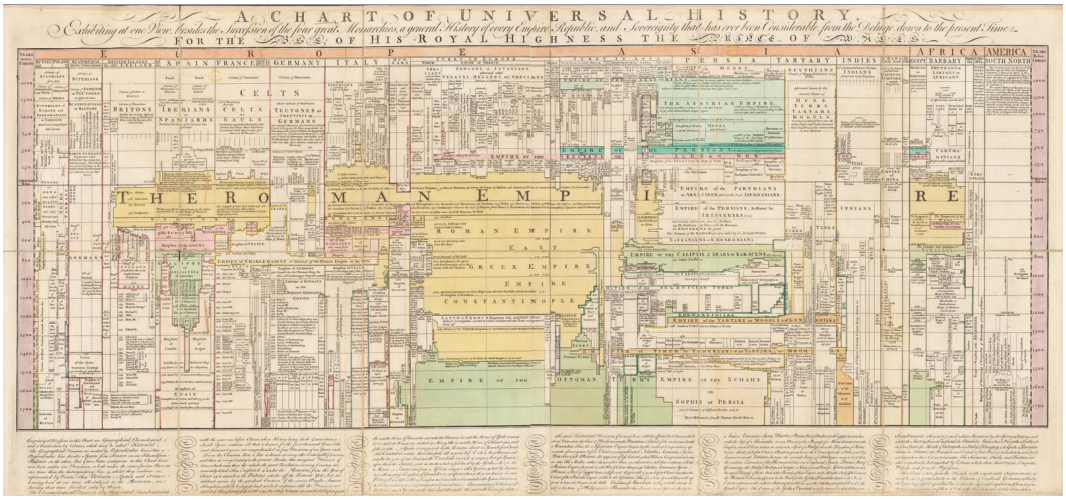

Fig. 1 Thomas Jefferys, *A chart of Universal History*, 1753.

occur, take place" (Anceschi, 1992, p. 105). It does not matter whether this object lies in the field of what is visible or invisible or that it pertains to the sphere of sensorially perceptible or the imagination. Since to the spectator's eyes, the depiction can only be assertive and therefore, situated in front of a 'set', the viewer no longer sees the designer or expedients or manipulation, being asked rather to interact directly with the object of depiction (Anceschi, 1992, p. 56).

But if the figure confers existence on the object of representation, it is therefore precisely the appearance of the figure, due to the character of the perceptual surrogate, which cannot be eliminated from any depiction, that transmits the content of the message and its meaning, also directing its interpretation (Massironi, 2002, p. 286).

SEEING TIME

We do not see time because time, "by habit, is made invisible" (Proust, 1978, p. 258). Yet we 'see' the world as if it were made "of corporeal objects immersed in a space where time flows" (Bellone, 2005, p. 14). Therefore, with this 'habitual vision', we can describe events by imagining, on the one hand, a purely spatial world and, on the other, a purely temporal flow.

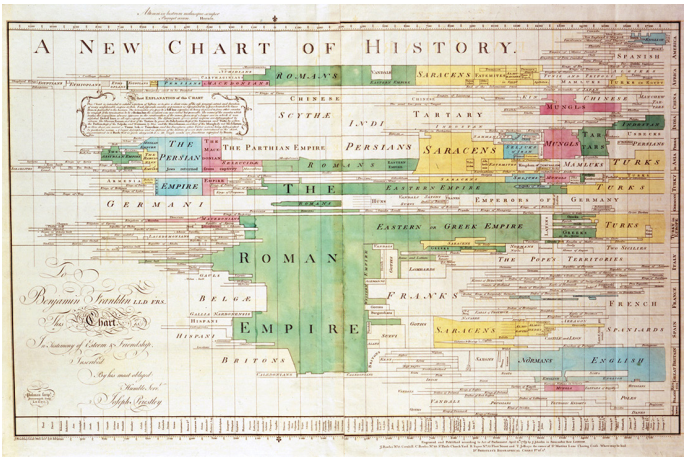

Fig. 2 Joseph Priestley, *A New Chart of History*, 1769.

This view of time leads to a qualitative distinction between before and after, between past and future, because the events of the past pertain to the sphere of what already happened, while those of the future pertain to what is to come. This 'becoming' is therefore characterized by a time equipped with an intrinsic arrow that flows between past and future in only one direction. This directionality gives us an idea of 'ordered' time in which the occurrences of events are connected by relationships of cause and effect.

We can depict this view of time with an oriented ray, broken up into uniformly distributed time intervals. This depiction is familiar to us because it is extremely widespread in communication and scientific, political, and economic publication, used as it is to interpret and present the world based on a set of data, distributions, correlations, and trends.

This depiction of time is even so familiar that it seems to be the only way we have ever had of representing it. Instead, linear, measurable time only became the norm starting in the Enlightenment, becoming adopted in the middle of the 1800s and further specialized via statistical graphics, themed maps, and, more recently, information graphic design.

This visual metaphor for time began to take shape in 1753 with the publication of *A Chart of Universal History* by Thomas Jefferys, a synoptic chart in which the chronology of history is shown as if it were a geographic map to be viewed all at once and therefore intuitively understood as a whole (Figure 1).

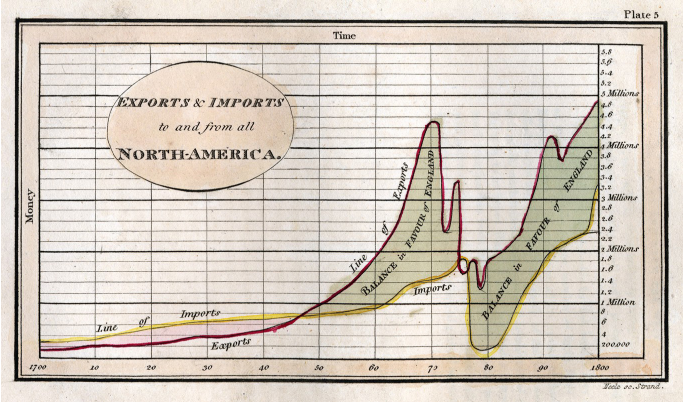

Fig. 3 William Playfair, *Exports & Imports to and from all North America*. In *The Commercial and Political Atlas*, Plate 5, 1786.

This revolution was later affirmed with the work of Joseph Priestley, who, revisiting the visual concepts at the base of Jefferys' work, perfected them, scientifically establishing criteria and rules to translate historical data into a visual medium. His *A Chart of Biography* was printed in 1765, followed by *A New Chart of History* in 1769 (Figure 2).

For Priestley, not only could each quality that can be expressed with numbers be translated into an oriented line, but all of time could be represented as a line that "flows uniformly from the beginning to the end of the tablet. It is also represented as flowing laterally, like a river, and not as falling in a perpendicular stream" (Priestley, 1770, p. 8).

Strongly convinced that the ordered distribution of events in graphics would enable their interdependence to be understood, Priestly displays the dates in his panels horizontally, in the direction of reading from left to right, observing rigid regular intervals. The result is a representation, well beyond that of history, of the image of time, an absolute, uniform, homogeneous time.

This form of graphics of the time was perfected even more in the work of William Playfair. Not only does he use an oriented line to distinguish before and after, past and future; the line is also measurable and inseparably tied to another perpendicular line, which is likewise oriented and measurable. The result is a system of axes, therefore, with which the equivalence between spatial and temporal coordinates is sanctioned and which is used to demonstrate how events are

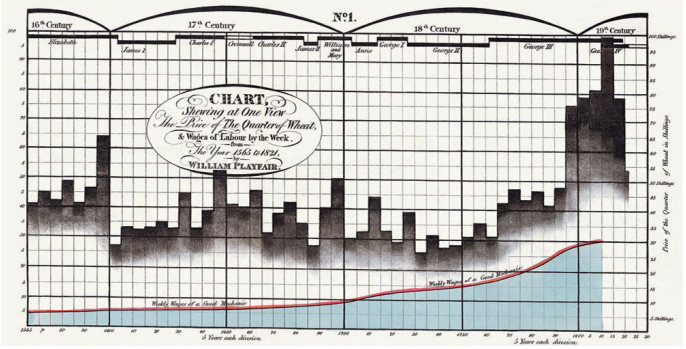

Fig. 4 William Playfair, *Chart, Showing at One View The Price of the Quarter of Wheat, & Wages of Labour by the Week from The Year 1565 to 1821*, 1821.

correlated by conditions of causality, while "space-in-itself and time-in-itself are destined to be reduced to shadows" (Minkowski, 1918, p. 288).

Despite appearances, however, this interpretation of the world is still profoundly classical because an event is still a point associated with a history and the history can therefore be depicted by drawing a universal line (Bellone, 2005, p. 57). Such a world is still travelled by 'becoming' and, especially, is still governed by space, the true vehicle of matter and time.

Compared to Jefferys' and Priestley's studies, however, the studies by William Playfair still show an essential novelty. His first important work, *Commercial and Political Atlas* of 1786, contains two orthogonal axes both with a uniform scale, where one measures time and the other economic quantities –exports, imports, public debt, taxes, cost of living, salaries, etc. For Playfair, understanding the history of the world or of men was no longer of any interest because in his world, space and history wind up coinciding with the economy (Figure 3).

An inventor of statistical graphics, Playfair used his 'infographics' to manifest logical/scientific thought that, transcending particular aspects, looked for general causes using a symbolic/formal language based on the principles of consistency and not contradiction, with which he intended to verify the neutrality of economic science (Figure 4).

In this view, diagrammatic representation serves exclusively as a tool to form hypotheses, a device based on hypothetical/deductive reasoning that proceeds by highlighting

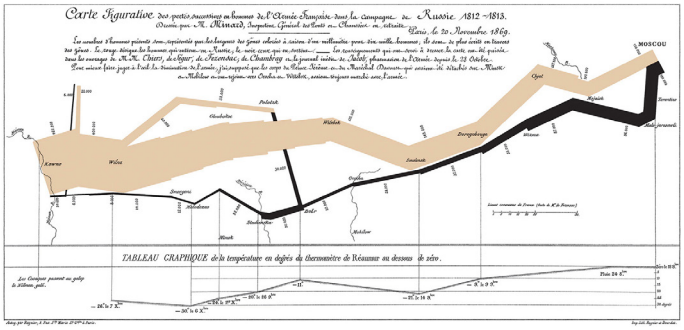

Fig. 5 Charles Minard, *Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813*, 1869. Minard's map, while based on rigorous data –the number and positions of the soldiers during the march with temperatures progressively encountered– nevertheless has the strength of a story, the defeat of Napoleon.

the differences and proceeding by discontinuity. It is rational knowledge that derives from the capacity to distinguish, punctuate, and discretize what is continuous and, therefore, based on abstraction.

For Playfair, statistical graphs, while being art, are therefore 'functional art', a tool to communicate the interpretation of a set of data to readers, using logical arguments to show distributions, correlations, trends and "for readers, a tool to analyse what is presented" (Cairo, 2013, p. 73). Hinging only on the author's and reader's reason, and fleeing from emotions, it is therefore more a presentation than a visualization.

Neutrality is only apparent, because a process of synthesizing data, depending as it does on the means of collection and selection, always includes value judgements. It is a partial and subjective interpretation of reality.

More in general, since it is the nature of each scientific illustration, as with each depiction, it cannot help being exclusively assertive (Figure 5). It is the mechanism underlying the spread of knowledge: building a consensus and undoubtedly conferring existence on knowledge through its depiction (Anceschi, 1992, p. 105). Consensus is reinforced by logical/scientific reasoning, and therefore by the rhetoric of demonstrative argumentation, the scientist/designer's authority, and the formal/expressive consistency of the composition.

As Priestley already knew, the strength of scientific illustrations lies entirely in the power of the visual medium "that

Fig. 6 Giorgia Lupi and Kaki King, 2017. *A dialogue between four hands*. Retrieved April 27, 2020, from giorgialupi.com. In http://giorgialupi.com/a-dialogue-between-four-hands-my-ongoing-collaboration-with-kaki-king

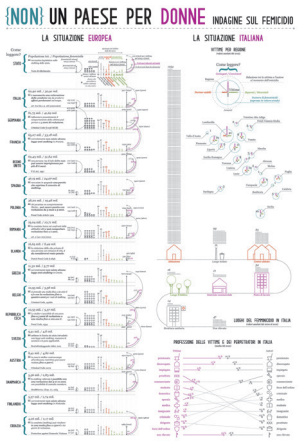

Fig. 7 Marco Bernardini, Marco Vecchioni and Chiara Veneruso. *(Not) a Country for Women. Investigations into Femicide*. Sapienza, Atelier of Public Design, Professor Elena Ippoliti, tutor Giulia Santucci, academic year 2013-2014. The theme of the year on opportunities and gender differences was addressed by analyzing femicide in Italy and Europe. 'Specialized figures' are created using temporal diagrams and a figurative use of 'writing'.

it makes visible to the eye, without reading, the whole figure […], that it not only in the most agreeable manner refreshes the memory without the fatigue of reading; but a novice […] may learn more from it by a mere attentive inspection of a few hours, than he can acquire by the reading of many weeks or months" (Priestley, 1788, p. 128).

The data always remain the tool and not an end, the rough material that allows other knowledge to be accessed. This was explicitly highlighted very recently by so-called data humanism (Lupi, 2017) whose goal is to shift attention from the numbers to the stories –people, knowledge, ideas– including empathy and imperfection and, through the vehicle of emotion, propose a possible relationship between beauty and truth (Lupi & Mancuso, 2017. Figure 6).

In the context of these reflections, some experimentation was carried out to develop infographics useful for supporting socially and culturally important communication campaigns regarding conflicting, controversial topics to create public experiences and participation (Figures 7, 8). This did not entail a sterile description of the data, but rather the design of understanding, turning data into information and combining them organically into meaningful visualizations, modelling shapes and colours that have the power to evoke emotion and excite people, thereby transforming information into the construction of meaning and the story into narration.

The infographic's communicational effectiveness was first of all entrusted to the formal/expressive consistency of space, which is resolved in the space of the panel and created starting from the intimate consistency of the graphical/visual units that compose the visual vocabulary. A unique path was chosen between the sign as a symbol, i.e. aniconic, and the sign as an image, i.e. iconic (Brandi, 1960). The design of the visual units was therefore differentiated according to the chosen formal/expressive horizon, characterizing itself as an abstract/plastic form (denoted by the lower figural density) or icon/analogue form (denoted by higher figural significance).

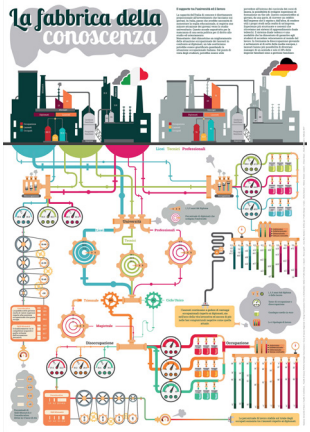

Fig. 8 Chiara Grossi and Giulia Giannarini. *La fabbrica della conoscenza*. Sapienza, Atelier of Public Design, Professor Elena Ippoliti, tutor Giulia Santucci, academic year 2016-2017. Data at hand, the infographic recounts, by means of a figurative graphic, the state of the university system, exposing the prejudice of the direct ratio between training and working conditions.

By starting with the visual vocabulary (shapes and figures, signs and images that act as symbols, icons, and indices) and working through a generative grammar (structure and recursive rules), visual syntagmas and then specialized figures were progressively designed.

Visual syntagmas are a unit, that is, figures already equipped with a complete expressive form combined first according to internal logic by operating on the eidetic properties (shape, size, colour, and texture) and using simple transformations (movement, rotation, translation, repetition, etc.). Then, following external logic, the two-dimensional space of the representation was addressed using topological categories (position, direction, orientation, etc.) to highlight the relational properties, that is, building further syntagmatic relationships among the different minimal units. Highly specialized figures were therefore generated. These were formed and derive from eminently perceptual acquisition: sheets, graphs, diagrams, etc., that is, particular systems of graphical notation specialized in expressing relationships and ratios, i.e. concepts "concerning quality, quantity, distribution, division, and their modifications and variations" (Massironi, 1982, pp. 98-99).

FEELING TIME

We do not possess biological sensors capable of detecting time, and yet we 'feel' time, a time different from objective, measurable time, the uniform, abstract time. What we feel is a qualitative rather than quantitative time, which, even when it entails a distinction between before and after, is not necessarily unidirectional because it is the concrete time of experience, for which it may also turn back on itself in a cycle.

To be imagined, understood, and interpreted, such time requires a representation and therefore "to become visible seeks bodies, which, wherever it finds them, it seizes upon to display its magic lantern upon them" (Proust, 1978, p. 258).

Fig. 9 Concrete time. *Maggio*, Aula Gotica, Complex of Santi Quattro Coronati, Rome, Photo Laboratory under the Special Authority for the historical, artistic, ethnoanthropological heritage and the museum complex of the City of Rome.

Thus, concrete time, tied to what develops within it, invents illustrated calendars (Figure 9) and a myriad of wheels and circles to give a shape to the perpetual succession of days and nights or seasons of the year (Figure 10). These representations depict reiteration and what is identical, where the stable shape of the circle –the ring that surrounds and encircles– describes a time that changes, only to inexorably return to itself; a time that does not "become" but "which remains immobile on the background of all particular durations" (Nuzzo, 2017, p. 6).

This representation of time holds together 'cosmic temporality' and 'historical temporality' and manages to coexist even with different representations when necessary to express the times of accidental and phenomenal events.

This is true, for example, of the chronological sequence in Medieval annals –with the recording of all events, natural and social, important or trivial– where the simple act of sequential annotation resolves the relationships of cause and effect (Figure 11). It also holds for the matrix structure of tables, with the parallel column layout of the chronology drawn from various historical sources, a tool for reconciling the different histories of the people and transforming the report into historiography and then into universal history. But this is also found, for example, in panel 18 of *Liber figurarum* by Gioacchino da Fiore from the beginning of the thirteenth century, a representation where time flows, but starting from a beginning and going towards an end. It is an oriented time, the expression of universal history, i.e. history governed by God and Providence (Figure 12). Gioacchino's time is, therefore, an arrow of time rather than a line of time and thus profoundly different from Playfair's time.

It is through these illustrated syntheses that the imagination harnesses experiential time, applying it to the 'objects' of the space, which therefore winds up coinciding with the space of the panel where time is specified by virtue of its own manifestation. This time "becomes human time in the degree to which it is articulated in a narrative way" (Ricoeur

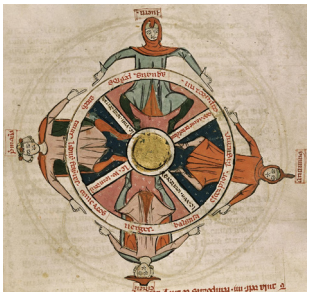

Fig. 10 The cyclical time. *Breviari d'Amor*, XIV sec., British Library, ms. Royal 19 C I f. 54v.

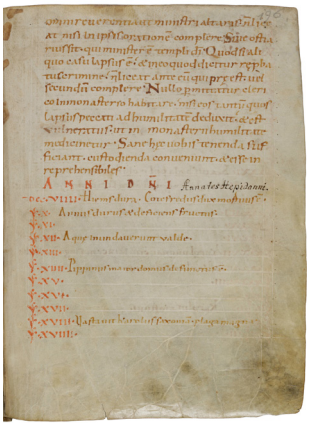

Fig. 11 *Capitolario*. The oldest *Capitolario* of the abbey of San Gallo, containing, among other texts, the Annals. St. Gallen, Stiftsbibliothek, Cod. Sang. 915, IX-X sec. Retrieved April 27, 2020, from https://www.e-codices.ch/it/list/one/csg/0915

1986, p. 15), because in the story, time finds a concrete explanation and "man prefigures, configures, and refigures the experience of time" (Barbieri, 1992, p. 134).

Time is not a thing, but a way of thinking about things.

Time proceeds bottom-up, approaching the world through the particular nature of experience, to relate actions and intentions, desires and convictions. The thought does not proceed by argumentation to show to us, through the rigour of the principle of causality, a universal condition of truth, but instead proceeds through plausible stories, interpreting rather than deducing, where the criteria of logical coherence is entrusted to that particular probable relationship between cause and effect, or better yet, between beginning and conclusion.

In contrast to scientific thought, where knowledge is built starting by highlighting the differences, the starting point in narrative thought lies in the recognition of affinity. Knowledge therefore proceeds through metaphorical information, that is, based on assertions or decrees of similarity and according to fluid, continuous action (Madonna, 2003, p. 101). It is a means of ostensive communication in which the organisms or systems are shown to be perceived aesthetically.

This thought has always also been made precisely by 'city representations' which, even when intentionally designed to act as a descriptive interface with reality, behave as a mediator between people and the world. This is true not just for the physical/geographical world, but "between the canonical world of culture and the more idiosyncratic world of beliefs, desires, and hopes" (Bruner, 1992, p. 62).

Since this communicational mechanism is based on the 'similarity of form', it therefore matters little that the same image serves to represent multiple cities (Figure 13) because it acts by virtue of that intimate, deep relationship that the memory of places builds in individual and collective sensitivity. They are 'tender' images capable of triggering a wide range of emotions and are therefore used as rhetorical figures of persuasion to tell stories and suggest interpretations (Mangani & Pasquinelli, 2007. Figure 14).

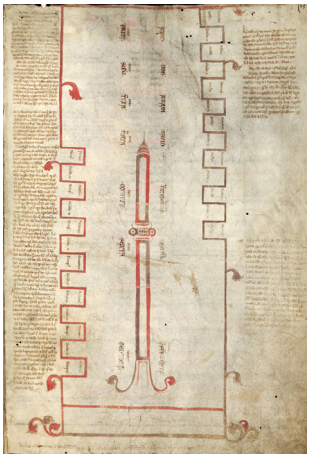

Fig. 12 The arrow of time. Gioacchino da Fiore, *Liber Figurarum*, Plate 18, XIII sec., Digital Bodleian Oxford. Retrieved April 27, 2020, from https://digital.bodleian.ox.ac.uk/inquire/p/118a90ea-d34a-41d7-bf95-7bc5a975402f

These depictions are capable of containing in the events themselves the simultaneous presence of multiple points of view –power, community, citizens, and therefore the author/designer/client and reader/target/spectator– and mending possible tears in time, i.e. perceptual tears due to the incompatibility of the different visuals. This is because the depiction, by attributing a position to each 'object', is an ordered system in which different points of view can be made to coexist. By acting on the spatial relationships among the elements in the panel, one therefore acts on the temporal relationships, that is, the methods of narrative discourse.

However, this comes with the condition that the depiction presents a recognizable style so that the formal consistency ensures temporal consistency. In fact, the semantic connections of equivalence established among the figures of the composition allow spatial discontinuities and jumps in time to be mended. The non-linear connections proposed by the figures of semantic opposition are instead entrusted with the time of the story, acting on the tale –the linear time of the story– to support the weave –the time of the discourse.

Space is therefore the 'board' on which experiential time becomes plausible.

These mechanisms and strategies remained substantially unchanged in 'city representations' throughout the 1900s. Among the vast array of well-known examples we find the experience of the Situationist International and the psychogeography of Guy Debord, whose cognitive maps explore the city space through the techniques of drifting and 'detournement' (Figure 15). It is a 'revolutionary' visual and to clarify his theories, Debord published in the movement's journal *Carte du Tendre*, the imaginary map that Madeleine de Scudéry had François Chauveau engrave in 1654 to show the emotional itinerary of Clélie, the protagonist of her novel, in the form of a landscape (Figure 16).

In the map, "emotions take the shape of a mobile topography" and crossing it "means becoming immersed in the ebb and flow of a personal yet social psychogeography" (Bruno,

Fig. 13 Naples on a page of *Liber chronicarum* by Hartmann Schedel, Nuremberg, 1493. The work contains a good 1809 illustrations, of which 1157 are, however, repeated. The etching of Naples is therefore also used for Aquileia, Bonomia, Lyon, Mainz, etc.

2006, p. 3). Giuliana Bruno defined this type of map/manifesto as emotional geography due to its capacity to exalt the narrative dimension and solicit movement in space and time, transforming places—real or virtual—into vehicles of emotions.

Limiting ourselves to only some of the most recent experiences, we cite the four psychogeographical maps of *Transecting Amsterdam. Project 360°* in which Frank Dresmé reinterpreted the city as a sequence of spatial opportunities, physical obstacles, and points of reference for those finding themselves crossing it (Figure 17). Another example is *Capriccio Romano*, by Benedetta Tagliabue with Jacint Todó, a reinterpretation of Rome rebuilt as a montage of fragments of memories of architecture and notable places in a series of visuals and perspectives through which private and public, intimate and monumental are recombined in a one-off (Figure 18). One final example is the 'narrative panoramas' (Graffieti, 2011) that, revisiting the astonishing optical machine patented in 1787 by the painter Robert Barker and the nineteenth-century panorama, revisit the experience of a total, immersive view.

While different, these city representations can be made to refer to the entire complex of representations ranging from illustrated schemas to taxonomic drawings, and whose functioning is above all analogous to the cartographic. In fact, they proceed through special figures, compositions of places and images, taking full advantage of the principle of similarity and the relationship between foreground and background. It is above all in the 'mapping', however, that the most peculiar cartographic techniques are used.

First, the locative: the positioning of elements in the space of the representation allows a specific function and belonging to be assigned to each element. In other words, it is the context that holds together the figures and graphical/linguistic signs, making them consistent and pertinent.

Then the narrative, i.e. the two main enunciative means of cartographic representation: description and story. In the description, the object is seen simultaneously from all points

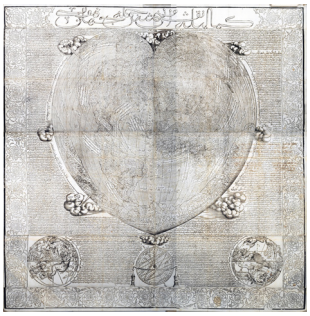

Fig. 14 Turkish-Venetian cordiform world map, second half of the sixteenth century. The 'heart-shaped' maps produced in the sixteenth century differ with respect to the theory of cordiform projection described by the German mathematician Johannes Werner in *Libellus de quatuor terrarum orbis in plano figurationibus* (1514). Retrieved April 27, 2020, from https://www.movio.beniculturali.it/bnm/ridottiprocuratorisanmarco/it/83/di-cosa-si-tratta

of view according to an atemporal spatiality; the view is total and synthetic, the interpretation unique. In the story, the gaze is a traveller's and the spatiality is the weave of possible itineraries; the different points of view are displayed according to the path taken and the temporal dimension is introduced by movement in space (Marin, 2001, pp. 81-82).

In the framework of these reflections, some graphical experiments were carried out with the aim of revisiting "city representations" to make different points of view coexist without having to display them hierarchically (Figures 19, 20, 21). In these representations, the linearities of the text and the temporal sequence of "before and after" are deconstructed to place the spectator in the scene; becoming an actor, the spectator starts to explore without following a pre-established path, but rather follows an individual thread of recollections.

The representational devices therefore adopted narration organized into episodes and an additive-type figural procedure: the individual fragments (icons, symbols, or signs) are brought together to compose the scenes, but act through highlighting (by isolating the fragment), and contextual meaning (by the arrangement in the scene). It is the spectator's gaze that recomposes the unity of the figure, retracing the unity of sense, that is, the object of the depiction.

To compose the individual episodes, each fragment is similar, suggestive, and arranged according to the right associations. As expedients to label the places, true indices of reference, graphics, and textual accessories stand out, differentiating themselves from the iconic basis.

Subsequent episodes are connected through graphical elements or brief views (to recall the surrounding scenes with hints or echoes), while the relationships between individual episodes, the relationships with the edges, and the balance of the entire panorama are especially curated in the general composition.

In these city representations, the narrative backbone is always composed of representations of the places superimposed on the narrative weave, which instead pertains to

experience. The experience may be perceptive, by passing through it, developed within the continuous relationships established between the associations of proximity and distance, both spatial and temporal. Or the experience may more specifically recollect the collective events and individual happenings of which the places are a memory.

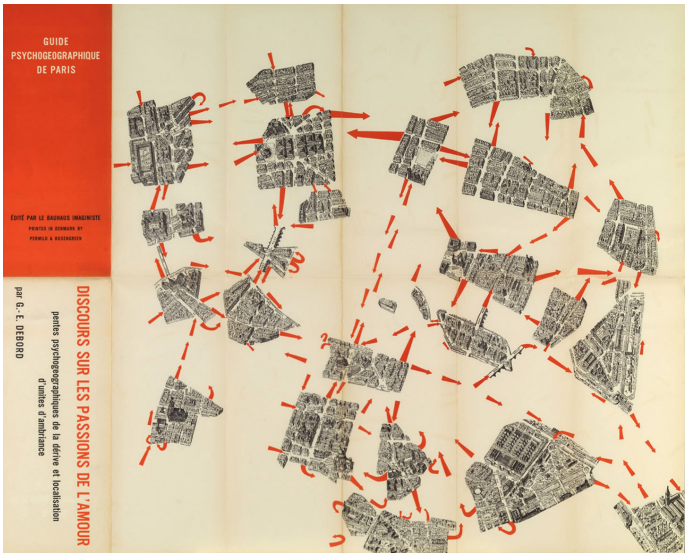

Fig. 15 Guy Debord, *Guide psychogéographique de Paris. Discours sur les passions de l'amour: pentes psychogéogrphiques de la dérive et localisation d'unités d'ambiance*, 1957.

HEARING TIME

The centrality of the sense of sight in cognitive and experimental processes is well known. It is therefore common to transfer non-visual sensory experiences to the field of view. This is true in particular of the field of music, where the translation of the sound event into a visual object has led to the definition of an increasingly specialized writing, entrusting the codification of knowledge to a support usable with the eyes.

This writing is supported by visual, graphical, abstract language. With the invention of systems of symbols and signs and using the complementarity of vision and sound and the unity of perception, it has allowed for movement in auditory space where orientation is difficult because "sounds

are fleeting ghosts: things can be grasped, ordered, governed, reflected, and appropriated; but sounds evaporate from every side" (Carapezza, 2009, p. 103).

Like in all notation systems, the writing is intimately "intrinsic to temporality" (Anceschi, 1992, p. 142) since it is used to store a memory to be recalled (Anceschi, 1992, p. 120).

The form of the writing is in fact an explicitly temporal figure; its temporal order is fixed for listening and reading. At the same time, however, its form is a figure of the memory, and therefore 'ordered writing' where each sign is so because it is found in a given relationship with some other sign. As memory, it is therefore "the place of order itself" and therefore is phenomenologically atemporal. It is also true that "without order there would be no temporality" (Barbieri, 1992, p. 141).

Temporal and atemporal writing, narrative and paranarrative, and therefore at once design and prescription, "an ingenious expedient to establish improvisation, where it can live again at a later time" (Lombardi, 1981, p. 9).

For this purpose the writing visually records not only sounds –instrumental and/or vocal– but also the set of instructions necessary for reading, interpretation, and even gesturing. A multimodal, intercode transduction from the beginning that has its roots in the neumic notations developed as support to perform the Gregorian chants (Figure 22).

Fig. 16 Madeleine de Scudéry and François Chauveau, *Carte du Pays de Tendre*, 1654. The Map appeared in the first volume of the novel *Clélie*.

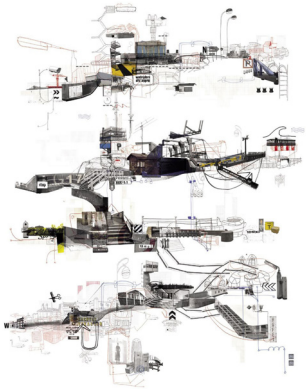

Fig. 17 Frank Dresmé, *Transecting Amsterdam. Project 360°*, 2007. Retrieved April 27, 2020, from http://www.bldgblog.com/2015/06/transecting-amsterdam/

Fig. 18 Benedetta Tagliabue and Jacint Todó, *Capriccio Romano*, 2012. Retrieved from April 27, 2020, https://www.exibart.com/evento-arte/benedetta-tagliabue-jacint-todo-capriccio-romano/

Here, the graphical signs (neumes) situated above the syllables of the chants indicated only the rise and fall of the voice to interpret the melody, overlooking the rest of the instructions then entrusted to the chanters' memory.

In a historical arc with its peak at the beginning of the 1900s, the need to control the interpretation therefore led the system of musical notation to be hypercodified with increasingly precise, rigid semiographic conventions up to the definition of standard or traditional musical notation (Goodman, 2008, p. 157). Faithfulness to the design/execution/listening relationships was favoured to the detriment to interpretational immediacy, giving musical notation an increasingly social character, that is, tied to questions of transmission, to the disadvantage of its perceptual character (Anceschi, 1992, p. 118).

This hypercodification created problems throughout the 1900s, with a plethora of experiments to contemplate possible relationships between the different people in musical communication –composer, player, listener– ranging from the writing of action to design writing, from music that should only be heard to music that should only be read.

For the latter, this really implies music only to be seen; in fact, detached from auditory execution, it is resolved exclusively "with graphics, ideograms, or nevertheless with systems referring to visual perception" (Lombardi, 1981, p. 12).

Examples of such experiments include those by the futurist Luigi Russolo on writing enharmonic music (Figure 23), as well as the better known experiments by John Cage who, rebelling against the tyranny of traditional musical notation, rejected the stave and transformed his musical scores into graphical art (Figure 24).

As much as this experimentation tried to free itself from the tethers of notational conventions, it still required a context that supported both communication and the shape of communication. Russolo, therefore, for his "spirals of sound", adopted a system of diagrammatic signs that were nevertheless arranged on the stave. The arrangement of Cage's auditory points in *Variations VII* (1961), in contrast, is not at all free; rather, it is hyper-restricted: from the enclosure of the rectangular frame to the five segments that allow frequency, duration, timbre, intensity, and succession of the auditory points to be indicated (Goodman, 2008, pp. 163-164).

Therefore, in order for communication to unfold, a notational system, or more generally a set of signs, as with all symbolic writing, requires a spatial reference system. The position of an element in a chemical formula –leading to different molecular configurations– the line in a fraction –distinguishing the numerator from the denominator– the grid of lines of longitude and latitude –uniquely identifying a geographical place on the surface of the Earth– the page and

Fig. 19 Angelo Testa, *Pigneto: Giorno-Notte*. Sapienza, Representation Teaching, Professor Elena Ippoliti, tutor Giulia Santucci, academic year 2014-2015. The panorama tells how Pigneto, the quarter of Rome, is transformed cyclically but always preserving its strong identity. The tale winds through the relationships between the inhabitants, large infrastructure, arches of the Roman aqueduct, alleys, and shops.

grid in a graphical layout –arranging the composition on the page– or storyboards –regulating the sequence of individual frames and therefore the position of viewpoints– etc. All are systems of spatial orientation.

The last two graphical experiments, which are described below, fall within the framework of these reflections. The first experiment is inspired by the procedural nature of standard musical notation: a set of instructions to complete a procedure whose final result, since the writing means to be prescriptive, nevertheless depends on the player's interpretation. For this reason, for example, a vast range of expressive signs are developed.

The writing supports multiple directions and times of reading and execution –horizontal, vertical, diachronic, synchronic– and view –analytical and synoptic. In a musical score, the horizontal shows the succession of sounds, while the vertical deciphers the notes to be played simultaneously, as well as the pitch according the position on the individual stave. Alternatively, a full score favours control of the entire musical composition or the orchestra and each instrument established for its performance. As well, with any type of score, as long as one is an expert in that code, the reading/performance can begin at any measure, including immediately, with just a glance at the situation without necessarily knowing what was previously described.

In the first experiment, the writing was applied to the visual transcription of a different type of regulatory text: recipes in the kitchen (Figures 25, 26). This case also relates to a set of instructions to regulate a procedure

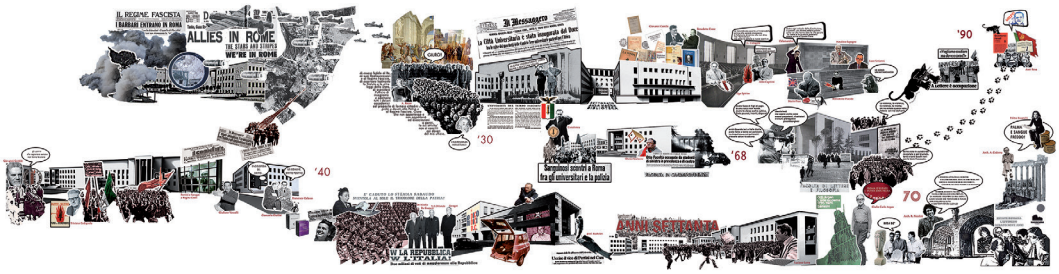

Fig. 20 Marco De Francesca, Master's Thesis, with Elena Ippoliti, supervisor, and Giulia Santucci, tutor, academic year 2013-2014. *Narrative Panorama of the Sapienza in the University City of Rome*. The narration on the human sciences from 1935 to 2015: events, people, buildings.

and attempt to prescribe the way to act in its interpretation. Two different procedures thus regulate the actions to be made on basic elements (notes or ingredients) using instruments or utensils to produce a complex, superior result (a sonata or a dish). There are nevertheless common elements, including, in particular, the component of 'time', intended as both a sequence and the duration of a process, and the aspect of gesture/interpretation.

For this purpose, after designing a vocabulary of icons for ingredients and utensils, a spatial system of reference was adopted also associated with a temporal reference. Each horizontal line represents an ingredient, while the vertical lines (the bar lines) mark the duration of the processes.

The key to reading lies in the vertical alignment of ingredients and utensils, which create a semantic association and establish an action. The processes are articulated by the measures, figures of duration, their connection, and the value point, while the means are defined by expressive marks.

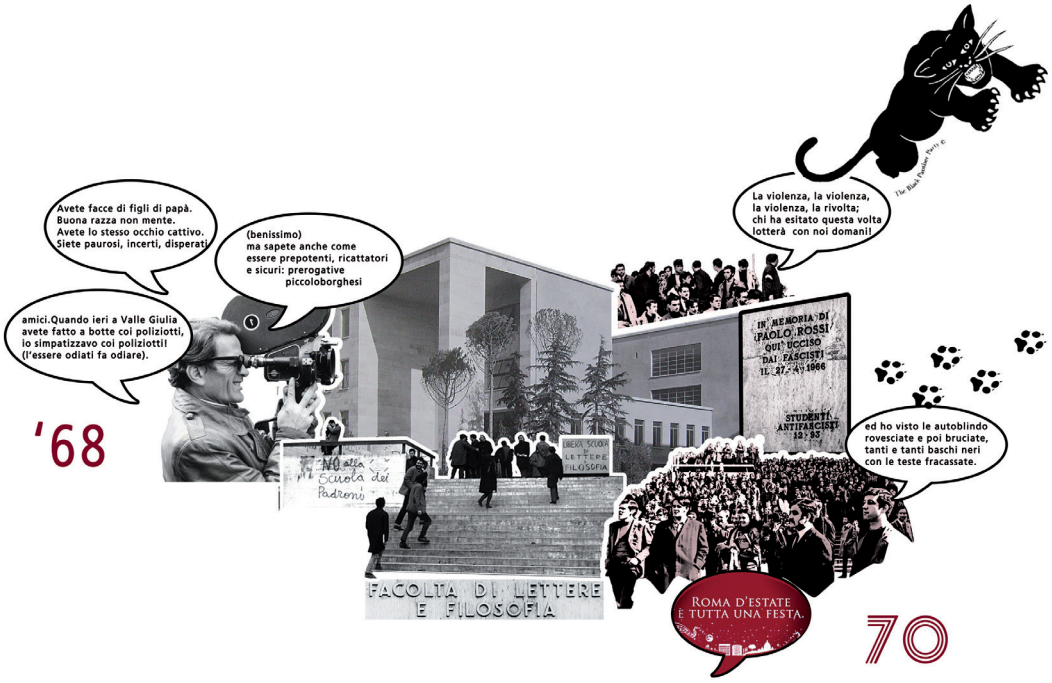

Fig. 21 Marco De Francesca, Master's Thesis, with Elena Ippoliti, supervisor, and Giulia Santucci, tutor, academic year 2013-2014. *Narrative Panorama of the Sapienza in the University City of Rome*. A scene-episode from the Narrative Panorama about the human sciences: the '68.

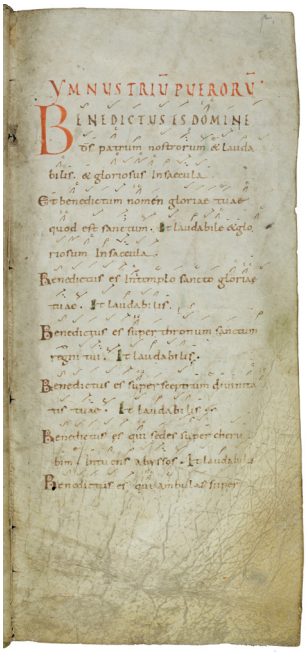

Fig. 22 *Il Cantatorium* di San Gallo, the oldest complete musical manuscript with Medieval neumatic notation. Copied and adorned with elegant neumes in the San Gallo monastery between 922 and 926. St. Gallen, Stiftsbibliothek, Cod. Sang. 359, f. 5 and f. 26, www.e-codices.ch

The second experiment instead aimed to give a shape to a particular musical performance: Op. 74 no. 10 by Ludwig van Beethoven as performed by *Quartetto Sincronie* (Figures 27, 28). This entailed the search for a multi-modal and intercode graphical/notational writing that could render not only the acoustic events but also the performance in an infographic.

The data for the experimentation derived from documentary material –in particular the scores annotated by the musicians– and observation during rehearsals and the performance of the four musicians: Houman Vaziri, Angnese Maria Balestracci, Arianna Bloise, and Valerio Cassano. For each instrument and performer, quantitative (duration of the notes and measures; the chords played; the size of the acoustic pressure) and qualitative information (taps of the feet; opening of the arms; displacement of the barycentre; reciprocal glances) was derived and then visualized. In particular, relationships were sought between the formal/expressive consistency of the whole and the individual parts –morphemes, visual syntagmas, and specialized figures.

The concentric/radial form was adopted as a system of reference that was both spatial –dimensional and tonal– and temporal –performance and interpretation. The centre of the circle is the focal point of the visualization and represents the performers, that is, the protagonists of the performance. The radial shape was chosen because it is a form that at once rolls up and is already unrolled, a form, therefore, capable of expressing the potentially cyclic time of the performance.

For example, in the first syntagma, the concentric grid expresses the measurement of the values of sound pressure, while the radial structure provides the timeline of the performance. In the second syntagma, the four concentric circles represent the chords of the instruments, while the radial grid describes the length of the measures. In the third syntagma, the dimensional grid expressing the dimensional classes of the bodily movements is made with three concentric circles, where the position of the morphemes is regulated according to the radial structure of the time of the performance.

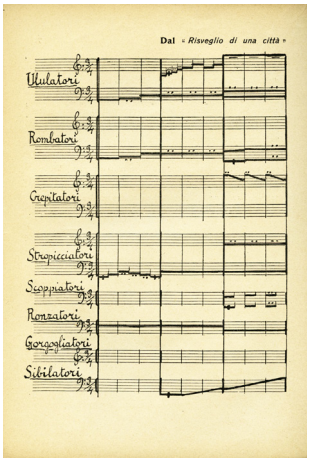

Fig. 23 Luigi Russolo, *Risveglio per una città per intonarumori*, 1913. Retrieved April 27, 2020, from https://www.comune.modena.it/salastampa/archivio-comunicati-stampa/2016/9/201cmodena-futurista201d-e-intonarumori-al-festival-filosofia

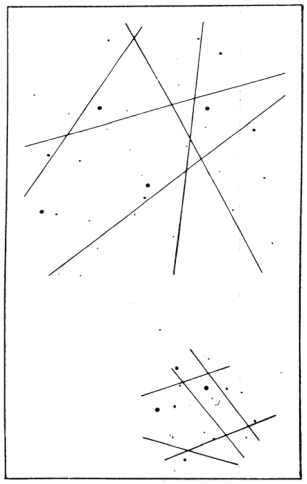

Fig. 24 John Cage, *Variations I*, 1961. In Cardini, 1981, p. 147.

The formal/expressive horizon chosen for the infographic is denoted by a low figural density: cone-shaped morphemes for the acoustic pressure; triangle, square, and circle for the tonal quality of the instruments; curved lines with peaks to describe the opening of the arm and the displacement of the barycentre; point-like notation with diamonds and 'commas'for taps of the feet and the glances.

The assembly of morphemes and syntagmas then led to the construction of specialized figures, one for each musician/instrument. Finally, to compose the infographic consistent with the object and objective of the experiment, the 'layout' was designed to visualize the 'set' of the performance. The placement of the specialized figures therefore reflects the position of the musicians on the stage, while the relationships among them are visualized with arcs that follow the exchange of glances between the musicians during the performance.

CONCLUSIONS

The reflections presented in this essay represent an opportunity to progress along some of the many paths of representation and to observe and verify some of its possible extensions. In particular, the reflections have aimed to underline how a representation always and contextually acts according to the two registers of diagram and figure, and that it is therefore not only a 'machine for presenting' but also a 'machine for thinking' and, even more, a 'machine for imagining'.

This is certainly not a novelty. Diagrammatic representations have always been used in the sciences and techniques to "translate everything, celestial or sublunary", making it "visible" to one's own eyes and then to the eyes of others (Maldonado, 2005, p. 53).

It should be noted, however, that diagrams are not only a specific type of representation, a particular schema or graphic equipped with a pre-established form (Chauviré, 2008, p. 36).

They are above all that particular way of proceeding that we follow or chase while we formulate a theory, do an experiment, or observe to understand a state of things, etc.

In fact, the effectiveness of diagrammatic representation derives from the efficiency of the diagram itself as a 'figure' that allows the relationships –functional, logical, temporal– of a system to be gathered and highlighted, i.e. the connections among the parts and between the parts and the whole, which implies an idea, a phenomenon, or object, whether real of hypothetical.

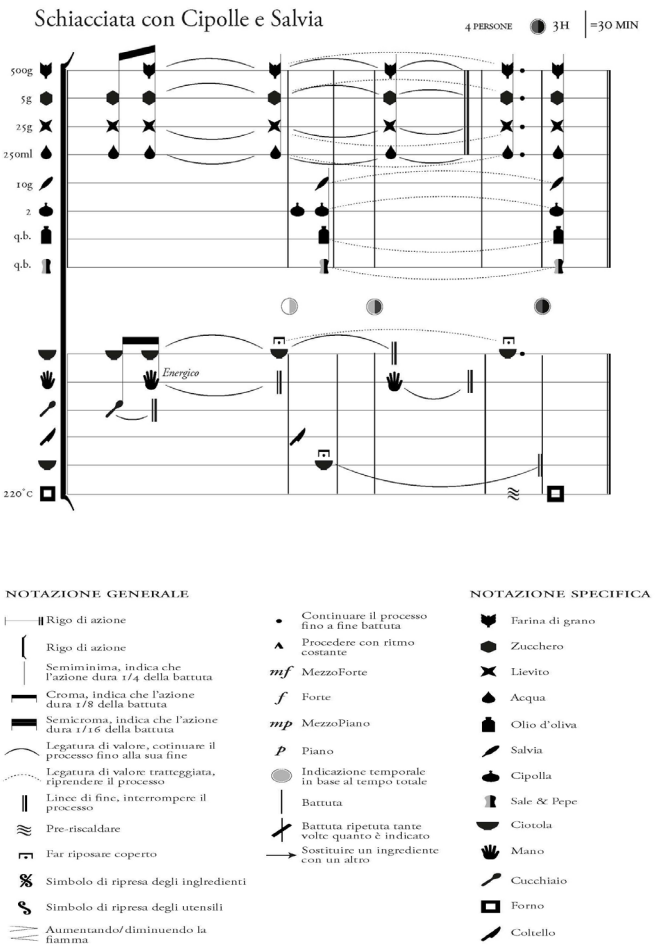

Fig. 25-26 Francesca D'Antonio with Massimo Costanzi, Elena Ippoliti and Eleonora Ippoliti, *Spartiti culinari, Schiacciata con cipolle e salvia*. This experimentation was carried out for the show *Guarda cosa mangi! Food Design Marathon to Expo 2015*, Perugia 2015, June 6, and tells a story based on food, weaving personal memories and culinary knowledge, local recollection and visual culture.

At the same time, diagrammatic representation is also the perceptually relevant form in which a thought is materialized, a thought that proceeds according to diagrammatic reasoning, where each deduction derives from the construction and observation of diagrams and which is progressively validated by means of perceptual judgement (Fumagalli, 2000, p. 174).

Therefore, the power of diagrammatic representation resides in being able to give a shape to the ideas and things of the world, both visible and invisible, bringing them into the perceptual/visual field. Because each diagram is itself

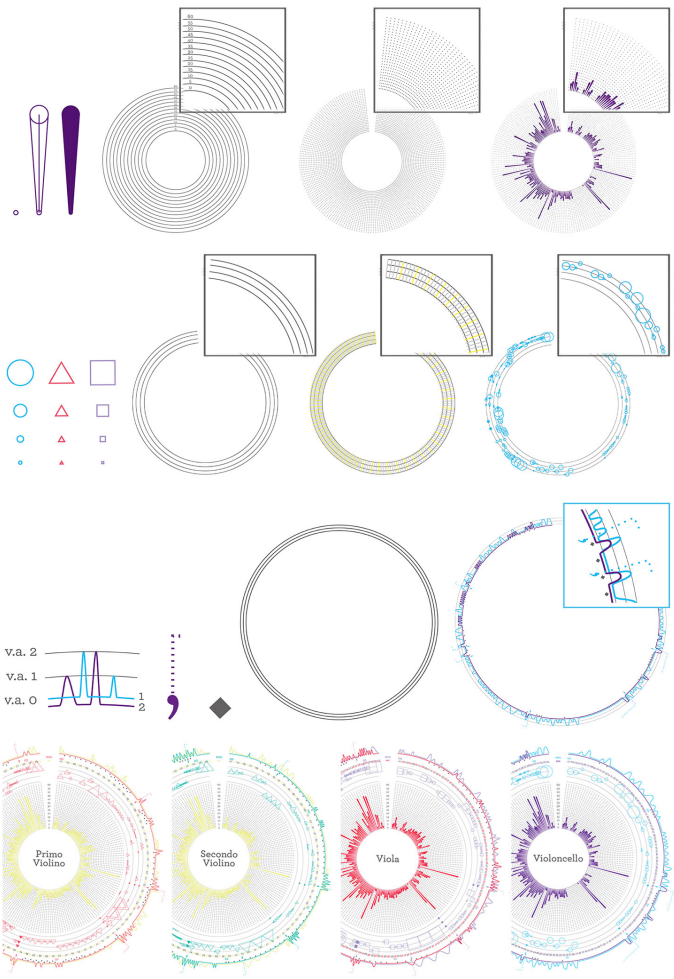

Fig. 27 Manlio Massimetti and Angela Testa, Master's Thesis, with Elena Ippoliti, supervisor, academic year 2017-2018. *Quartetto Sincronie performing Beethoven op. 74, num. 10*. The design phases of the syntagmas and the specialized figures, one for each musician/instrument

intrinsically a figure and its functioning is related to the connections of similarity it establishes with the world –where the world can be understood and imagined via the representations and vice versa– the representations derive from what we are able to understand and imagine of the world (Madonna, 2003).

We therefore believe that these reflections, while only partial, demonstrate how representation, in addition to being necessary, binds paradigmatic thought and narrative thought, and therefore cognition and experience, logic and aesthetics, systems and parts, varying in the range of possible coincidences between 'page layout' and 'set', function and metaphor, relation and modulation, or diagram and notation.

The representation is therefore a device capable of holding together what is observable and what is imaginable (Dondero, 2015), individual and general, sensory experience and intelligible experience, perception and concept.

It is therefore fruitless to try to look for a universal scheme of representation (Barwise & Etchemendy, 1995), while it is necessary to confirm the need for multimodal reasoning capable of integrating linguistic, graphical, and diagrammatic systems (Shin, 2002).

It is also true, however, that in the practice of visual communication and representation with images, the only rule

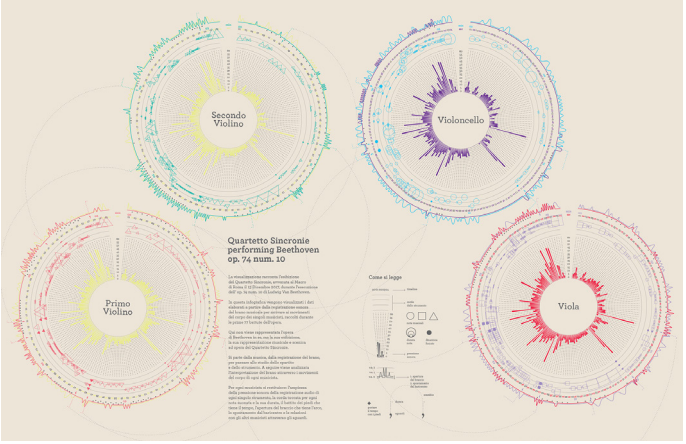

Fig. 28 Manlio Massimetti and Angela Testa, Master's Thesis, with Elena Ippoliti, supervisor, academic year 2017-2018. *Quartetto Sincronie performing Beethoven op. 74, num. 10*. The composition of infographic.

can be to work by exercising Einstein's so-called epistemological opportunism, which consists in testing "different, alternative routes, drawing liberally on all conceptual directions" (Minazzi, 1990). The rule is therefore to work "from reference, perception, sensory quality and aesthetics" (Anceschi, 1992, p. 6), reaffirming the radically non-linguistic logic of what is figural, and by extension the view, which resists any attempt at translation into a linguistic text (Pinotti & Somaini, 2016). "Of an aesthetic text no summaries are given. There is nothing to which it can be reduced" (Barbieri, 1992, p. 256).

Therefore, we return to where we started –the particular 'object' of time and temporality adopted to reflect on representation– and recall how an "aesthetic text is the place in which time is expressed in a language in the most irreducible way: producing an aesthetic text means producing the possibility of an irreducibly temporal experience" (Barbieri, 1992, pp. 256-257).

REFERENCES

Anceschi, G. (1992). *L'oggetto della raffigurazione*. Milano, IT: Etas Libri.

Barbieri, D. (1992). *Tempo, Immagine, Ritmo e Racconto. Per una semiotica della temporalità nel testo a fumetti*. (Doctoral dissertation, University of Bologna, Italy). Retrieved from http://www.danielebarbieri.it/texts/temporitmoraccontoperimmagini.pdf

Barwise, J., & Etchemendy, J. (1995). Heterogeneous Logic. In J. Glasgow, N. Narayanan, & B. Chandrasekaran (Eds.), Diagrammatic Reasoning: Cognitive and Computational Perspective (pp. 211-234). Boston, MA: The MIT Press.

Bellone, E. (2005). *Spazio e tempo nella nuova scienza*. Retrieved from https://www.liberliber.it/mediateca/libri/b/bellone/spazio_e_tempo_nella_nuova_scienza/pdf/bellone_spazio_e_tempo_nella_nuova_scienza.pdf

Brandi, C. (1960). *Segno e Immagine*. Milano, IT: Il Saggiatore.

Bruner, J. S. (1992). *La ricerca del significato*. Torino, IT: Bollati Boringhieri.

Bruno, G. (2006). *Atlante delle emozioni: in viaggio tra arte architettura e cinema*. Milano, IT: Mondadori.

Cairo, A. (2013). *L'arte funzionale. Infografica e visualizzazione delle informazioni*. Milano; Torino, IT: Pearson.

Carapezza, P. E. (2009). Musurgia Naturalis. In C. Fertonani, E. Sala & C. Toscani (Eds.), *Finché non splende in ciel notturna face* (pp. 99-106). Milano, IT: LED Edizioni Universitarie.

Chauviré, C. (2008). *L'Œil mathématique: essai sur la philosophie mathématique de Peirce*. Paris, FR: Kimé.

Debord, G. (1957). *Guide psychogéographique de Paris. Discours sur les passions de l'amour: pentes psychogéographiques de la dérive et localisation d'unités d'ambiance.* Copenaghen, DK: Permild & Rosengreen.

Dondero, M. G. (2015). La forma diagrammatica fra matematica e arti. *Rivista Italiana di Filosofia del Linguaggio*, pp. 349-361.

Eco, U. (2009). *Vertigine della lista*. Milano, IT: Bompiani.

Fumagalli, A. (2000). *Il reale nel linguaggio: indicalità e realismo nella semiotica di Peirce. Milano*, IT: Vita e Pensiero.

Gombrich, E. H. (1985). *L'immagine e l'occhio. Altri studi sulla psicologia della rappresentazione pittorica*. Torino, IT: Einaudi.

Goodman, N. (2008). I linguaggi dell'arte. Milano, IT: Il Saggiatore.

Graffieti, M. (2011). *Il panorama narrativo* (Master's thesis, Polytechnic of Milan, Italy). Retrieved from https://www.politesi.polimi.it/

Lombardi, D. (1981). Spartito preso. A proposito della scrittura musicale contemporanea. In G. Cardini & al., *Spartito preso. La musica da vedere* (pp. 9-19). Firenze, IT: Vallecchi.

Lupi, G. (2017). Data Humanism. The Revolutionary Future of Data Visualization. *PrintMag*. Retrieved from https://www.printmag.com/information-design/data-humanism-future-of-data-visualization/

Lupi, G., & Mancuso, M. (2017). I dati non sono solo numeri. *Digicult*. Retrieved from http://digicult.it/it/news/dati-non-sono-solo-numeri-alcune-carissime-domande- giorgia-lupi

Madonna, G. (2003). *La psicoterapia attraverso Bateson*. Torino, IT: Bollati Boringhieri.

Maldonado, T. (2005). *Memoria e conoscenza: sulle sorti del sapere nella prospettiva digitale*. Milano, IT: Feltrinelli.

Mangani, G., & Pasquinelli, B. (2007). *Città per pregare. I risultati di una ricerca tra Marche e Umbria*. Paper presented at the Conference Icone urbane. La rappresentazione della città come forma retorica tra Medioevo e Controriforma, Macerata, Italy.

Marin, L. (2001). La mappa della città e il suo ritratto. Proposte di ricerca. In L. Corrain (Ed.), *Della rappresentazione* (pp. 74-94). Roma, IT: Meltemi.

Massironi, M. (1982). *Vedere con il disegno: aspetti tecnici, cognitivi, comunicativi*. Padova, IT: Muzzio.

Massironi, M. (2002). T*he psychology of graphic images. Seeing, drawing, communicating*. London, UK: LEA.

Minazzi, F. (1990). Realismo senza dogmi. In F. Selleri, & V. Tonini (Eds.), *Dove va la scienza: la questione del realismo* (pp. 9-50). Bari, IT: Dedalo.

Minkowski, H. (1918). Time and Space. *Monist*, 28, 288-302.

Nuzzo, E. (2017). En el nombre de la nueva ciencia. Conocimiento y ciencia de la historia en la cultura occidental. In nome della nuova scienza. Conoscenza e scienza della storia nella cultura occidentale. *Ciencia Nueva. Revista de Historia y Politica*, 1(1), 2-47. Retrieved from https://revistas.utp.edu.co/index.php/historia/article/view/14351

Playfair, W. (1786). *The commercial and political atlas representing, by means of stained copper-plate charts, the progress of the commerce, revenues,*

expenditure, and debts of England, during the whole of the Eighteenth century. London

Pinotti, A., & Somaini, A. (2016). *Cultura visuale: immagini, sguardi, media, dispositivi*. Torino, IT: Einaudi.

Priestley, J. (1770). *A Description of a New Chart of History*. London, UK: Printed for J. Johnson.

Priestley, J. (1788). *Lectures on history and general policy. To wich is prefixed an Essay on a course of liberal education for civil and active life*. Dublin, IE: P. Byrne.

Proust, M. (1978). *Alla ricerca del tempo perduto*. Torino, IT: Einaudi. (Original work published 1913-1927).

Ricoeur, P. (1986). *Tempo e racconto*, Milano, IT: Jaca Book.

Shin, S. J. (2002). *The iconic logic of Peirce's graphs*. Cambridge, MA: The MIT Press.

ADDITIONAL READINGS

Arnheim, R. (1974). *Il pensiero visivo*. Torino, IT: Einaudi.

Cardini, G., Castaldi, P., Guaccero, D., Lombardi, D., Placido, B., Salvi, S., Simonetti, G. E., & Villatico, D. (1981). *Spartito preso. La musica da vedere*. Firenze, IT: Vallecchi.

Cardone, V. (2016a). Immaginare un'area culturale delle immagini visive. *XY Rassegna critica di studi sulla rappresentazione dell'architettura e sull'uso dell'immagine nella scienza e nell'arte*, 1(1), 12-27.

Cardone, V. (2016b). Editoriale. L'idea giusta al momento giusto. *XY Rassegna critica di studi sulla rappresentazione dell'architettura e sull'uso dell'immagine nella scienza e nell'arte*, 1(2), 4-9.

Casale, A. (2018). *Forme della percezione: dal pensiero all'immagine*. Milano, IT: Angeli.

Cicalò, E. (2016). *Intelligenza grafica*. Roma, IT: Aracne.

De Seta, C. (2011). *Ritratti di città: dal Rinascimento al secolo XVIII*. Torino, IT: Einaudi.

Eco, U. (1979). *Lector in fabula: la cooperazione interpretativa nei testi narrativi*. Milano, IT: Bompiani.

Empler, T., Quici, F. & Valenti, M. G. (2016). Urban exploration as a way to get know the built environment: from the analog to the digital flânerie. In A. Marotta, G. Novello (Eds.), *Disegno & Città. Cultura, Arte, Scienza, Informazione/Drawing & City. Culture, Art, Science, Information* (991-1000). Roma, IT: Gangemi.

Gil, F. (1980). Rappresentazione. In *Enciclopedia Einaudi* (pp. 546-583), Torino, IT: Einaudi.

Greimas, A. J., & Courtés, J. (1979). Illusione referenziale. In P. Fabbri (Ed.), *Semiotica: dizionario ragionato della teoria del linguaggio* (pp. 149-150), Firenze, IT: La casa Usher.

Internationale Situationniste (1959). L'urbanisme unitaire à la fin des années '50. *L'Internationale situationniste*, 3, 11-16.

Ippoliti, E. (2012). Tra mappa e territorio. In *Idee per la rappresentazione 4. Trascrizioni* (pp. 79-89). Roma IT: Artegrafica.

Ippoliti, E. (2013). Una storia fatta di figure. Neurath e l'information design. In F. Dal Falco (Ed.). *Lezioni di design: manuale didattico di economia, sociologia, comunicazione, scienze esatte, ingegneria, scienze umanistiche, tecnologie, laboratori per il design* (pp. 164-173). Roma, IT: Rdesignpress.

Ippoliti, E. (2017). Renewing Glances. Design and its Practice. Representing, Communicating, Narrating. *Diségno. Biannual Journal of the UID - Unione Italiana per il Disegno Scientific Society/ diségno*, 1, 143-154. Retrieved from https://disegno.unioneitalianadisegno.it/index.php/disegno/article/view/21

Ippoliti, E., Massimetti, M., & Testa A. (2020). It's time for data! Modulations of representation: visible, perceptible, imaginable. In E. Cicalò (Ed.), *Proceedings of the 2nd International and Interdisciplinary Conference on Image and Imagination IMG 2019* (pp. 1047-1060), Cham, CH: Springer.

Ippoliti, E., Santucci, G., & De Francesca, M. (2015). Narrative panoramas for the University City project. Telling about places through images. In A. Marotta, G. Novello (Eds.), *Disegno & Città. Cultura, Arte, Scienza, Informazione/Drawing & City. Culture, Art, Science, Information* (pp. 1031-1039). Roma, IT: Gangemi.

Mangani, G. (2006). *Cartografia morale. Geografia, persuasione, identità*. Modena, IT: Franco Cosimo Panini.

Moktefi, A., & Shin, S. J., editors (2013). *Visual reasoning with diagrams*. Basel, CH: Birkhäuser.

Pascolini, A. (2006). Immagini e comunicazione scientifica: dalla descrizione all'evocazione. In N. Pitrelli, & G. Sturloni (Eds.), *Governare la scienza nella società del rischio* (pp. 137-145). Monza, IT: Polimetrica, International scientific publisher.

Rella, F. (2004). *Pensare per figure. Freud, Platone, Kafka, il postumano*. Roma, IT: Fazi Editore.

Sassatelli, R. (2011). Cultura visiva, studi visuali. *Studi culturali*, 8(2), 147-154.

Schedel, H. (1493). *Registrum huius operis libri cronicarum cum figuris et ymaginibus ab inicio mundi*. Nürnberg, DE: Sebaldi Schreyer & Sebastiani.

Shin, S. J. (1994). *The logical status of diagrams*. Cambridge, UK: University Press.

Toti, A. M. P. (2009). I fatti sociali come "icone". Per una epistemologia della visualità. *Sociologia: Rivista quadrimestrale di Scienze Storiche e Sociali*, XLIII(1), 51-64.

Wunenburger, J. J. (1999). *Filosofia delle immagini*. Torino, IT: Einaudi.

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