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EDITORIAL

ISSUE 02 APRIL 2020 Graphics

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The second issue of *IMG journal* publishes some in-depth contributions presented at the second *IMG* conference held in Alghero in 2019, after the first edition held in Brixen in 2017[1]. Although all the contributions have been already published in the proceedings of the conference[2], has emerged the need to deepen and to give more visibility to the debate on the topic of the conference, or the exploration of the 'graphic sciences' and their role in contemporary society. Indeed, the *IMG2019* conference was aimed to recompose the elements detectable in the international panorama of research in the fields of studies focused on the production of images; that can be labelled through the "expression graphic sciences" (Cardone, 2016).

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Within the international literature, the "graphic sciences" are only partially recognizable through this name (Massironi, 2002; Suzuki, 2002). Instead, these fields of investigation are often included within academic disciplines that assume different names, such as, the "visual sciences" (Bertoline, 1998), or the "image sciences" (Mitchell, 2015). 'Visual sciences', 'image sciences' and 'graphic sciences' are just some of the different possible definitions that can be found in literature which, although representing different approaches and disciplinary traditions, are often used as synonyms.

The *IMG2019* conference was conceived not only as a colection of research presentations but was itself a research experiment aimed at verifying a hypothesis –i.e. the definition of a field of knowledge definable as 'graphic sciences'–, through a method –i.e. the collection and analysis of data from call responses–, to achieve a result –i.e. the verification of the possibility of defining and representing the hypothesized 'graphic sciences' and its different fields of investigation. The verification of the hypothesis was made by analysing the submissions sent in response to the call for paper and for images and by creating a knowledge taxonomy linked to the contents of the 'graphic sciences', also through the use of a infographic representation able to visualise the complexity of the results thus obtained.

Each edition of the *IMG* conferences explores the world of images through a particular focus, and the *IMG2019* does so by proposing the keyword *-graphics* with the following meanings. *-graphics* is a linguistic suffix that adjectives what come from the sphere of *-graphia*, that is, description, study, writing, drawing. What is graphical uses signs on different supports and means. What is graphical consists of a weave of significant signs, concerns the drawing, is expressed in an image.

-graphics is the suffix that distinguishes the arts and sciences that have as their object the description of a subject also through images.
-graphics is a suffix that can be combined with several roots to create neologisms and new images, experimental and alternative forms for the description of subjects, even unusual.
-graphics refers to a plural vision of the modes, techniques, sciences and arts of description and representation drawn through images.
-graphics can be the scientific visualizations, design images, communication techniques, modes of expression, works, forms of narration, strategies of learning and construction of thought.
-graphics are the bodily or mental elaborations that the individual produces through his perceptive, cognitive and executive functions.
-graphics are the encodings through which the representations of invisible, intangible, ephemeral or immaterial phenomena and subjects are experienced.
-graphics can be defined the sciences involved in the study of methods and techniques for the production of visual artefacts, images and their uses in the most varied fields of knowledge and society.
Therefore, *-graphics* is the extension that *IMG2019* imagined to use to indicate the nature of the subjects on which it intends to focus and the domain to which the themes that the conference intends to study and deepen belong.
The responses to the conference calls have declined the proposed keyword in a plural way, outlining six major fields of interest of the 'graphic sciences' hypothesized:
- graphic thinking and learning;
- drawing, geometry and history of representation;

- digital modeling, virtual and augmented reality, gaming;
- graphic languages, writing and lettering;
- graphic communication and digital media;
- data visualization and infographic.

These areas have made it possible to represent the complexity of genealogy and geography of what have been hypothesized to be the the 'graphic sciences' that find different names and characterizations in the international arena but that are united by their contents, belonging to the sphere of production, analysis and interpretation of images in the most varied fields of application. This genealogy and geography of the 'graphic sciences' has been represented in infographic form through an image that has been taken as a map and graphic index of the conference. Starting from Massironi's diagram of the graphic production (Massironi, 2002), and in line with his internal rules, an update of the diagram has been hypothesized in the light of the new digital technologies.

The diagram drawn takes into account not only the technological innovations, but completes the taxonomy of Massironi with the elements missing in it but present in the other taxonomies analyzed[3]. The new graphic representation of the subjects of study of the 'graphic sciences' thus obtained, even if without any ambition of exhaustiveness and objectivity, allows to highlight the genealogy, the geography and the taxonomy of these knowledge to start a discussion on the different fields of their study and on their mutual relations.

In conclusion, Massironi's graphic model inspired by a river network continues to highlight the possibilities of movement, exchange, contributions, confluences and ramifications within a liquid network and therefore in a continuous transformation in which the knowledge produced in one node passes through the

various ramifications reaching all the others, almost following the principle of communicating vessels that restores unity to a system of apparently non-communicating nodes that are actually strongly connected, as the fields of the 'graphic sciences' which appears to be not a single discipline with monolithic methods and univocally and preventively determined objectives, but rather as a set of linked fields of study with a non-unitary repertoire of interests.

Notes

1 The proceedings of the first IMG International and Interdisciplinary Conference - Immagini? Image and Imagination between Representation, Communication Education and Psychology are published by MDPI at the link https://www.mdpi.com/2504-3900/1/9

2 The proceedings of the second IMG International and Interdisciplinary Conference on Image and Imagination are published by Springer at the link https://link.springer.com/book/10.1007/978-3-030-41018-6

3 The full version of this article was published in Cicalò E. (2020). Exploring Graphic Science, in Cicalò E. (Ed.), Proceedings of the 2nd International and Interdisciplinary Conference on Image and Imagination IMG 2019, Springer, pp. 3-14.

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ANATOMOGRAPHICS

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3D IMAGING
SURVEY
ANATOMY
ARCHITECTURE

'Anatomographics' is a neologism that intends to embrace the wide range of digital representations and images dealing with anatomy. However, this last term seems by now no more confined to the medical disciplines but instead able to describe approaches and methodologies that are typical of other fields of expertise. In this framework, the paper tries to outline how much the digital revolution has influenced medical and architectural 'anatomographics' providing an insight on common approaches, data processing and visualization.
The analysis carried out on some representative examples clearly show that 3D modelling and 3D imaging are standing out as major interleaved methodologies in which geometric points on one side and pixels on the other create new unexpected interactive tools to understand the anatomic complexity of bodies and buildings.

INTRODUCTION

Νοεῖν οὐκ ἔστιν ἄνευ φαντάσματος. It is impossible to think without an image.

This very well-known quote from Aristotle (4th century B.C.E./1972, 450a 1; 4th century B.C.E./1961, 431a 15-20 & 432a 8-12) still synthesises at best the role that images play in that complicated recursive process of abstraction, creation and construction that we call 'thinking'. This high-end human ability (maybe the most valuable evolutionary advantage of our species) actually exploits images both in the inception phase of the workflow and at its end, where they represent instead the ultimate result of thinking. Regardless their material or non-material nature, images thus represent a crucial fuel for our mental speculation of which 'knowledge' is certainly an essential part. By means of images, in fact, we get in touch with the environment around us, we create abstract configurations of it, we imagine new layouts and we design tools and processes to manipulate it.

The variable nature of images in connection with the imaginative/perceptive process has been a traditional subject of investigation for researchers in the Representation area (Belardi, Cirafici, Di Luggo, Dotto, Gay, Maggio & Quici, 2015; De Rubertis & Clemente, 2001) even though in the last years it has become collateral in comparison with other topics (e.g. 3D capturing, 3D modelling, etc.).

Recently, though, some new and original studies (Casale, 2018; Cervellini, 2012; Cohen-Or & Kaufman, 1995; Luigini & Panciroli, 2018) have been revitalizing the debate on images, suggesting both a more comprehensive general theory and relationships that visibly exceed the limits of our traditional Representation boundaries. From this standpoint, Medicine and Architecture have been living parallel lives: though very different, they both base a relevant part of their core activities on images production, reading, interaction (Di Giamberardino, Iacoviello, Tavares, & Jorge, 2012). In my opinion, the utmost field of this emerging consonance is 'anatomy', term

that by now seems no more confined to the medical disciplines but instead able to describe approaches and methodologies that equally belong to other fields of expertise like Architecture. In this framework, 'anatomographics' is the neologism with which I intend to embrace the wide range of digital representations and images dealing with anatomy in this broader sense. This paper tries to outline how much the digital revolution has influenced medical and architectural 'anatomographics' providing an insight on common approaches, data processing and visualisation.

ANATOMOGRAPHICS AND MODELS

Anatomographics are definitely 'images,' namely bidimensional rendered figures. However, they always act also as 'representations'. The difference is quite easy to understand: the former is a product valuable in itself (like a work of art), the latter instead is the last ring of a precise chain of events (geometrical, physical, psychical) that binds the bidimensional image to the original 3D object in a complex correspondence that under certain circumstances could become biunivocal (Bianchini, 2014). The Representation Methods (perspective, orthogonal projections, axonometry and contour projections) considered in the wider and rigorous framework of the Projective Geometry, are the tools that allow for the establishment, control and validation of the above mentioned biunivocal consistency. The whole workflow governing this process assumes as a pre-requirement the correspondence between the real object and its geometric abstraction, the so-called Geometric Model (Migliari, 2004).

Through the application of the traditional Representation Methods (Docci & Migliari, 1992), this abstract counterpart of reality becomes eventually a Bidimensional Graphic Model that generally takes the form of a line drawing or a rendered figure. All these 2D products, collected in books or atlas, still represent the key tool for students in order to learn

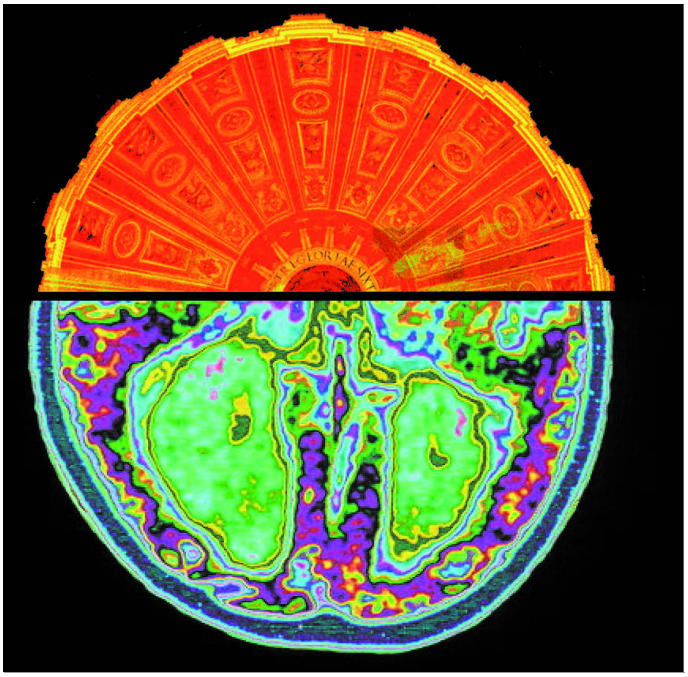


Fig. 1 Anatomographics: St Peter's Dome point cloud (above) and functional RNM (below).

and understand the spatial configurations and relationships of the 3D structures that they will deal with during their studies and career. In brief, 2D models allow for a 3D 'mental' reconstruction of structures' 3D features. Even if 3D 'material' models traditionally do provide an important contribution for this same knowledge process, their overall impact has always been less relevant essentially for practical reasons (Bianchini, 2007).

Digital modelling systems have actually introduced some relevant novelty in this standard workflow. In fact, while for the Bidimensional Graphic Models the process establishes a biunivocal correspondence between the object and its graphic representation by means of projection and section operations, for 3D Digital Models this correspondence is established between spaces: the real world and the virtual one created by 3D modelling software. They are thus very different from traditional 3D Models that live in our same world as real objects being subjected to same limitations of any manufacturing process. Besides, they are always scaled with

respect to the original with an evident loss of accuracy in metric terms.

3D modelling software, instead, more than producing a mere representation of the object provides the possibility to interact with an entire digital environment that, initially empty, is step by step populated by elements that together build a virtual replica of the object.

This process establishes a direct correspondence 1:1 between the physical and the virtual space: to each small objectual area Pr identified by its coordinates *xr*, *yr*, *zr* in the real space corresponds in fact a geometric virtual point Pv univocally identified by the Cartesian triplet *xv*, *yv*, *zv* (Bianchini, 2007, 2014). Hence, the digital environment created by 3D modelling software provides an actual spatial scaffolding for all the following constructions and, from this standpoint, the computer screen becomes the interface between two parallel universes: the real one on this side of the monitor, the virtual instead on the other. However, it represents also the ultimate limit of our exploration, the Maya Veil that we can never cross and that causes our interaction with all virtual entities (navigation, modelling and manipulation) to occur only using special, digital tools. Something similar to the robotic arms that allow the no-contact handling of hazardous objects of substances.

Virtual models are thus certainly three-dimensional, but on the other hand are also non-material. Made of numeric data, they do not produce in fact any material element capable even of a simple 'evocation' of the original object. The anatomographical image we interact with on the monitor is actually a 'secondary' projection/section product derived from this 3D non-material model and often built directly by the visualisation hardware of the workstation. Furthermore, while using graphic models we have to decide beforehand the type of representation without the possibility of changing it on the fly (if we are drafting a perspective we cannot change it in an axonometry at will). Non-material ones, instead, leave users free to change their mind in any moment

shifting from one to another even accessing simultaneous different view just acting on the visualisation options.

This is in my opinion one of the main reasons why 3D modelling and the connected digital representations forms have by now become commonplace in the design, knowledge and communication of the spatial features of real structures. In the sense, I have proposed in the previous lines for the word 'anatomy', both architecture and medicine are profiting of modelling software potentials especially in terms of exploration, manipulation and modification of the space.

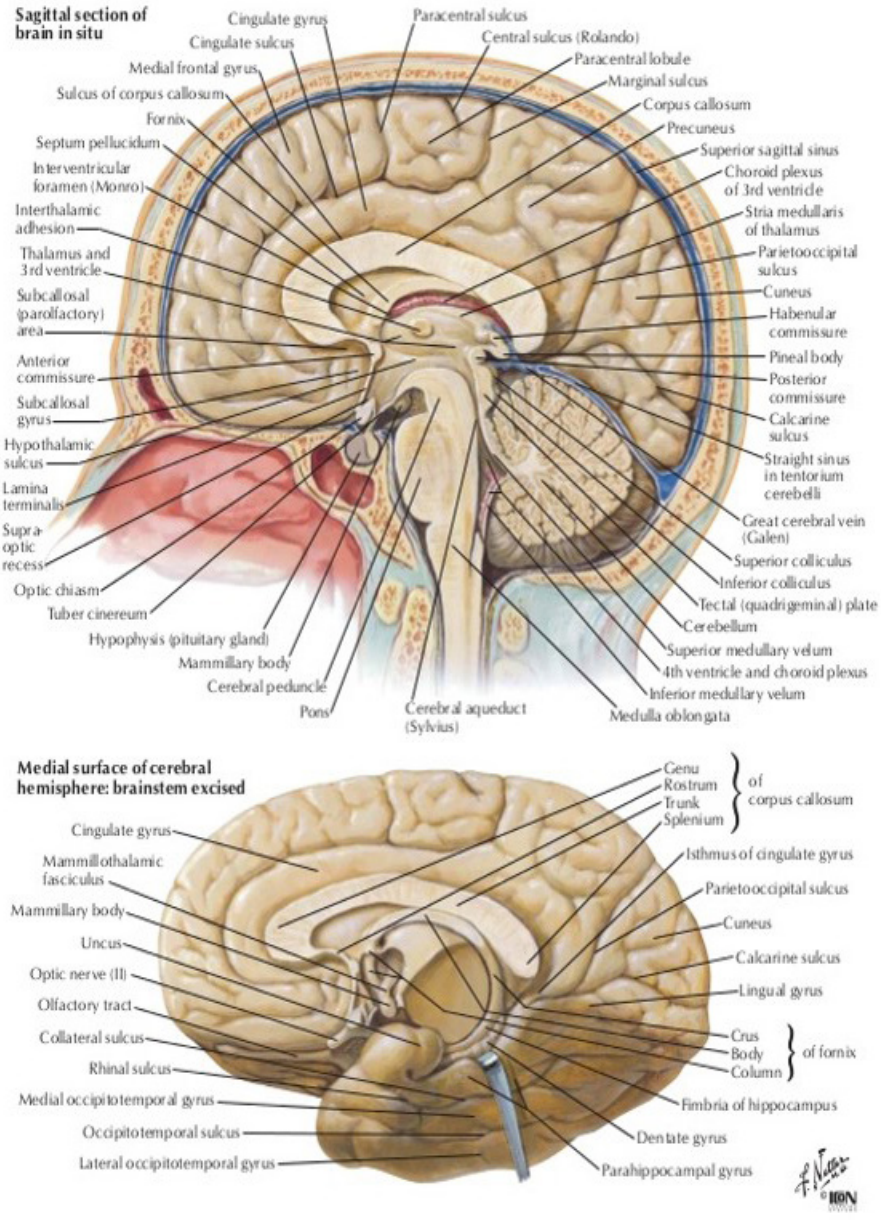
PIXELS, VOXELS, POINTS

All representations we consider in this paper (2D, 3D, conventional, digital, etc.) do share a common character that allow for their general grouping under the category Model. This common denominator corresponds theoretically and operationally to the procedure used to transform objectual areas in geometric points, pixels or voxels. Although this transformation relays on the common projective background discussed so far, however it presents great differences between architectural and medical applications. This diversity, apparently intrinsic to architecture and medicine, depends instead on the material composition of the structures investigated and on the specific aim of this investigation. In fact, while architecture shows a prevalent interest in the 'outer skin' of constructions, medicine's quest has always been tending in 'going beyond the skin' in order to reveal, understand and eventually intervene on biological structures. In my opinion, this one of the key factors determining the almost incompatible approach we historically observe in the architectural and medical modelling: the former essentially oriented towards quantity and geometry, the latter instead to quality, composition and functionality of structures.

Despite this divergence, still both disciplines have continued to share graphic representations and drawing as key

Fig. 2 Frank N. Netter, Atlas of Human Anatomy (Netter 1989, p. 2).

NEUROANATOMY — Cerebrum: Medial Views



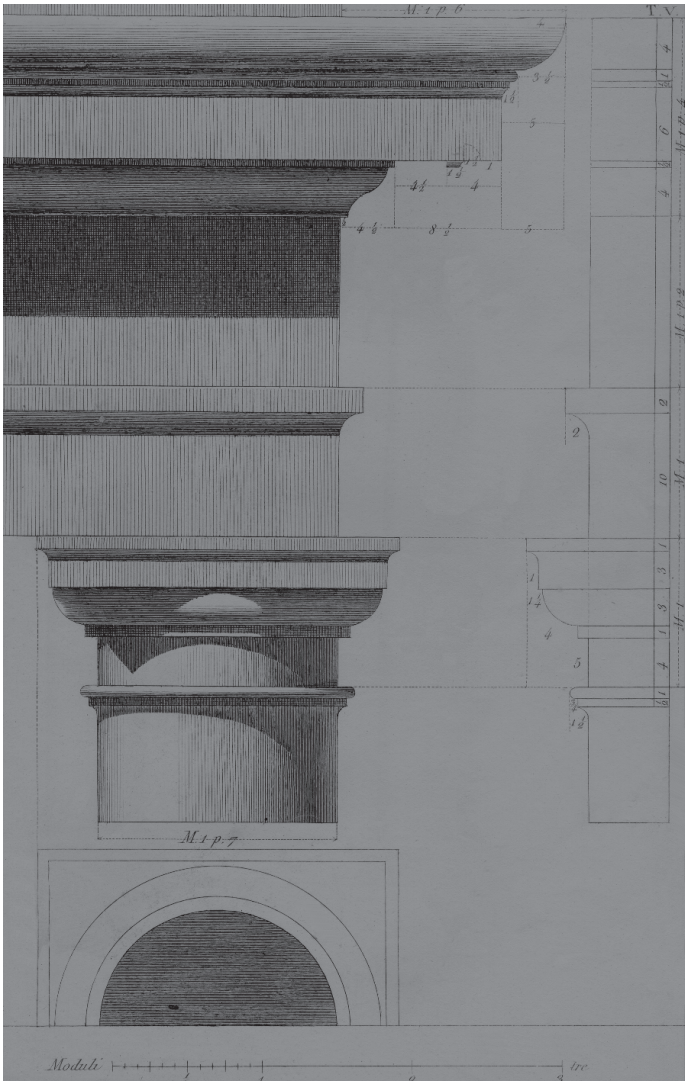


Fig. 3 Jacopo Barozzi da Vignola, *Tuscan order* (Barozzi da Vignola, 1889, plate III).

'technologies' to acquire, establish and transmit information. In other words, to create the reference database about families of structures as well as specific ones. Architectural manuals and anatomic atlas, flourished since the XV century, provide clear evidence of this phenomenon and even today still represent an untouched vehicle of knowledge transfer (Figures 2, 3). Nevertheless, technology has been increasingly providing new instruments tending to enhance

and finally transform this consolidated scenario. The core of this change is strictly connected to the use of a new class of images no more produced by a skilled painter or sketcher, but instead automatically generated by some kind of equipment: photography and radiography. Both share the same projective principles: a family of straight lines (light from the object, the x-rays from the radioactive source), converging in a center of projection (the focal point of the camera or of the radiographic equipment) and cut by a plane (the film). For the first time in history, there was a way on one side to document point by point the surface of objects and, on the other, to materialise on a surface the image of biological structures that where beyond the skin of living bodies (Figures 4, 5).

Since these fundamental steps, terrific progresses have been made even before the so-called digital revolution. Photography has quickly developed into photogrammetry thanks to the theoretical achievements of Guido Hauck (Migliari, 1989) at the end of XIX century becoming a key technology for surveying built artefacts. Thanks to continuous technological achievements, it has maintained its role of high-end technology until the end of XX century (Bianchini, 2004). Radiography followed a different path (Figure 6): before becoming commonplace, it had not only to solve the technological issues connected with dimensions, radioactive materials supply and general safety, but also with the 'reading' of the images impressed on the film. Differently from light rays that allow the precise reconstruction of the straight line connecting the objectual area to the corresponding point of the photograph, the emitted x-ray crosses completely the biological structures between the emitter and the film so that each point of the image could represent any point of the objectual layers encountered. This 'geometric' uncertainty actually affects the representation itself as the shading of each point directly depends on the average density of the structures crossed.

In this framework, while a photograph is 'iconic', namely a generally and immediately recognizable representation

Fig. 4 Wilhelm Röntgen, *X-ray by Wilhelm Röntgen of Albert von Kölliker's hand*, 1896. Image courtesy: Wikimedia Commons, the free media repository.

Fig. 5 Louis Daguerre, Picture of Boulevard du Temple, 1838. https://en.wikipedia.org/wiki/File:Boulevard_du_Temple_by_Daguerre.jpg.

of the pictured object, radiographs appear instead vague simulacra of the portrayed body and undetailed representations of its structures (Figures 6, 7). In fact, soon after the discovering of the physics of the phenomenon and the envisioning of its medical applications, it has taken much time to develop a method capable to backread the 3D source from the impressed image. The strategy, still valid, has been twofold: on one side set up reference standard images of organisms adopting a statistic approach, on the other enlighten in terms of pathology any possible variation with respect with this standard.

Despite the very quick and very wide success of this technology for diagnosis and some improvements in terms of accuracy, the 'modelling', i.e. the reconstruction of the biunivocal correspondence between 3D biological areas and points on the image was totally depending on the skill of the reader. This scenario has though radically changed after the migration of this method into the digital environment.

The transition from analogic films, always one and only, to digital images made of pixels has been the first crucial step. Images have in fact somehow 'dematerialized' becoming *raster* files, namely a matrix of values each one representing a punctual reading of the energy received from the x-ray

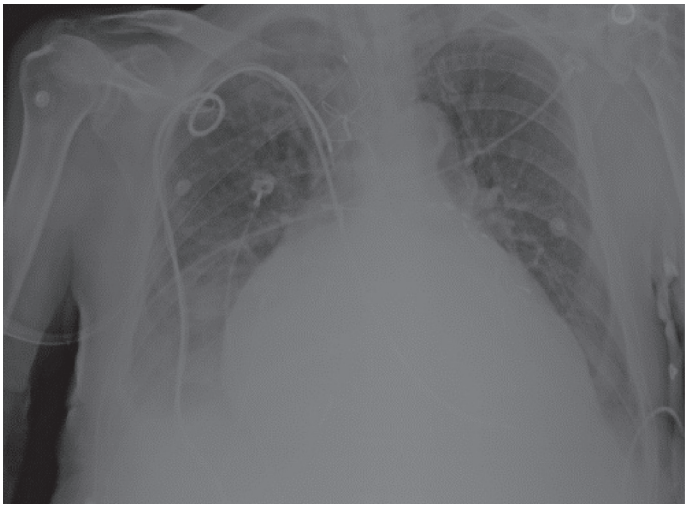


Fig. 6 Sheng Chen and Yuantao Cai, *Enhancement of Chest Radiograph in Emergency Intensive Care Unit by Means of Reverse Anisotropic Diffusion-Based Unsharp Masking Model*.

source. From this ordered set of data, the classical impressions on a film or their screen projections are just two of the possible secondary elaborations of the same original file. The above-mentioned transformation led quickly to envisage an x-ray generator that, moving around the body and projecting on detectors positioned on the opposite side of its circular trajectory, could generate several shots of the same structures from different angles. It is the well-known Computed Axial Tomography (CAT) now become Computed Tomography (CT) (Fishman et al., 1991; Toennies, 2017. Figure 8).

In this case, all radiographs have in common the internal orientation and density as well as the position in space of each center of projection as the movement of the emitter

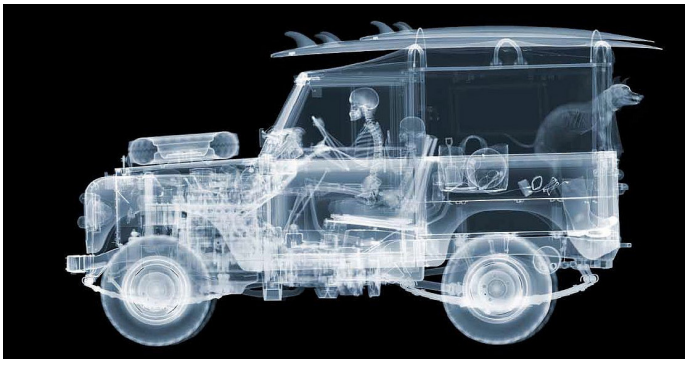


Fig. 7 Nick Veasey, *1972 Land Rover Surfer*, 2018. ÆRENA Galleries and Gardens, Ed. 12/25 (2018).

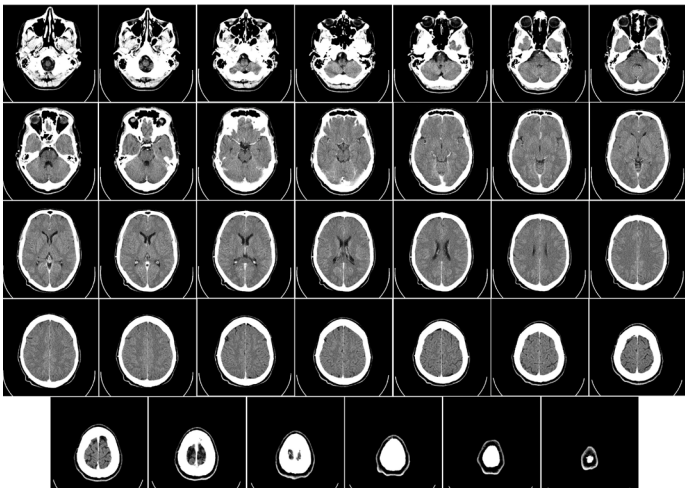


Fig. 8 TC Images. https://upload.wikimedia.org/wikipedia/commons/5/50/Computed_tomography_of_human_brain_-_large.png.

with respect to the object is tracked. It is quite easy to recognize the same geometric background of photogrammetry, both in its analogic 'vintage' version and in the present one (the so-called Structure from Motion - SfM). The projective core of both systems lays on the 3D reconstruction of several projective rays all crossing in a certain 3D point. While SfM can directly achieve this result just acknowledging the geometry of the system, CT must instead introduce an additional computation. As we already mentioned, an x-ray produces on the projection plane (receiver) a point (pixel) that is not the 2D projection of a corresponding 3D source but instead of an entire segment, namely the intersection with the crossed structure. The visual representation of this raw data (the sinogram) is not sufficient for interpretation. In fact, it must be processed using the so-called 'tomographic reconstruction' that produces a series of cross-sectional images where pixels are displayed in terms of relative radiodensity according to the Hounsfield scale (Toennies, 2017). These 2D images not only are the result of a sophisticated mathematical computing but also the product of a secondary projection that grants them a clear iconic value. CT images take in fact the form of slices cut perpendicular to the feet-head direction of the patient. They thus approximate the sections we could perform on the real body and from this feature descends the iconic value we mentioned before. In this framework, it connects directly with the system of representation widely used in the pages of anatomy

treatises. Even if the mathematics underneath is much complicated (Bradley, 2008), we can intuitively understand that from an ordered spatial sequence of planar tomographies we can build a 3D model just adding 'thickness' to each slice. This process called 'voxelization' (Cohen-Or & Kaufman, 1995. Figure 9) actually transforms the bidimensional pixels into their solid counterpart: the 3D voxels. Thanks to this sophisticated interpolation, CT allows for the construction of 3D models of the investigated structure achieving the original objective of the whole process: create a sound and reliable correspondence between 3D portions of the real world and 3D points of the virtual one. Nowadays, we all know that CT represents only a fractional part of medical imaging. In fact, the Nuclear Magnetic Resonance (NMR), Echography, Positron Emission Tomography (PET) and others have all become powerful means for the anatomical investigations. For its level of accuracy and very low impact on living tissues, NMR has quickly become a leading method. Although its technical, operational

Fig. 9 Voxelization. Immagine da http://cdn.wolfire.com/blog/voxel/voxels.jpg.

Fig. 10 Bianchini C., S. Peter's Dome, 3D texturized point cloud from scanner.

and mathematical backgrounds are incredibly more sophisticated of all others imaging techniques (Bradley, 2008), however it shares the same principles and objectives: discretize a physical effect by numeric values, locate them in a common 3D space as voxels, and build a general 3D numeric model as collection of all voxels. None of these extraordinary technological achievements would have determined the pervasive presence of these imaging products without a digital infrastructure capable to store, process and represent/render the mentioned above 3D numeric models: 3D modelling software. As end-users, we tend to focus on the final outputs (images) and bypass the conceptual implications we have discussed at the beginning about the 'magical' effect triggered when launching any 3D modeller, namely the creation of a 3D 'parallel' virtual space.

Capturing technologies for architecture are quite different from those addressing medical issues. Nevertheless, they lead to very similar outcomes both in term of imaging and 3D modelling. The background geometry is though very different even if it is applied to the same 3D virtual environment. The 'solid' voxels become in fact three-dimensional points, that is to say elements identified in the 3D space by a triplet of coordinates. What we see

Fig. 11 Bianchini C., Amman Nymphaeum, 3D texturized point cloud from SfM.

on screen is actually the projection and rendering of such geometric points. Furthermore, these points are 'directly' captured in the real word either as endpoints of a star of polar rays centered in the laser beams emitter or as reverse intersection of several light rays coming from the same material area (Figures 10, 11). In both cases, the process leads to a discretization of the real world's continuum much different in comparison with the voxel modelling. In fact, voxels fill up completely the 3D space as little cubes attached one to another while 3D points are like outcrops emerging from an ocean of unknown data. Is thanks to the following meshing and gap filling phases that we achieve a continuous representation of the investigated object.

Beyond these steps (voxelization for medicine, surface construction for architecture), anatomographics provide the same opportunities for both disciplines having as pivotal element the possibility of visualization, exploration and manipulation of the 3D model. In other words, they allow not only doing better what we used to do before (i.e. construct 2D representations) but above all what before was simply not possible. The opportunities that 3D models offer to medicine are quite evident especially for those structures, as the brain, that have been difficult or impossible to study using invasive methods (Figure 12). The same is

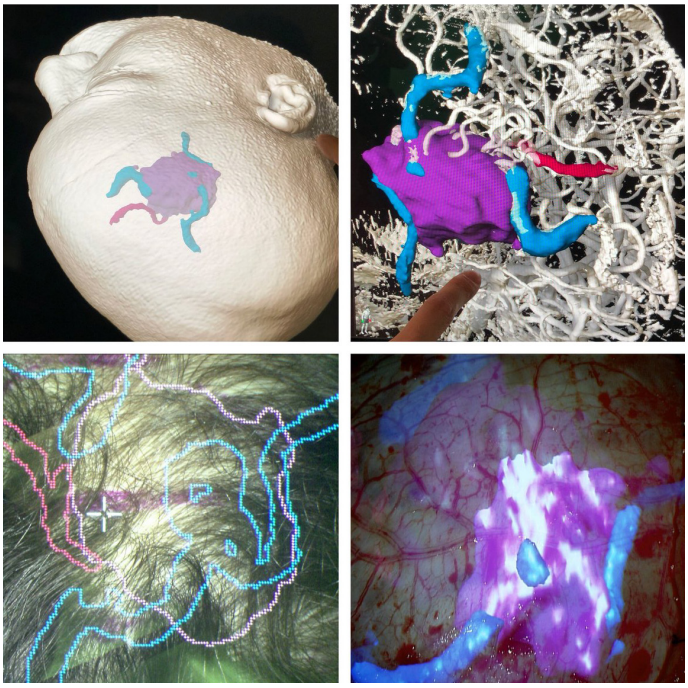


Fig. 12 Martino J et al. Neurosurgery, 3D modelling of brain structures from NMR. 2013

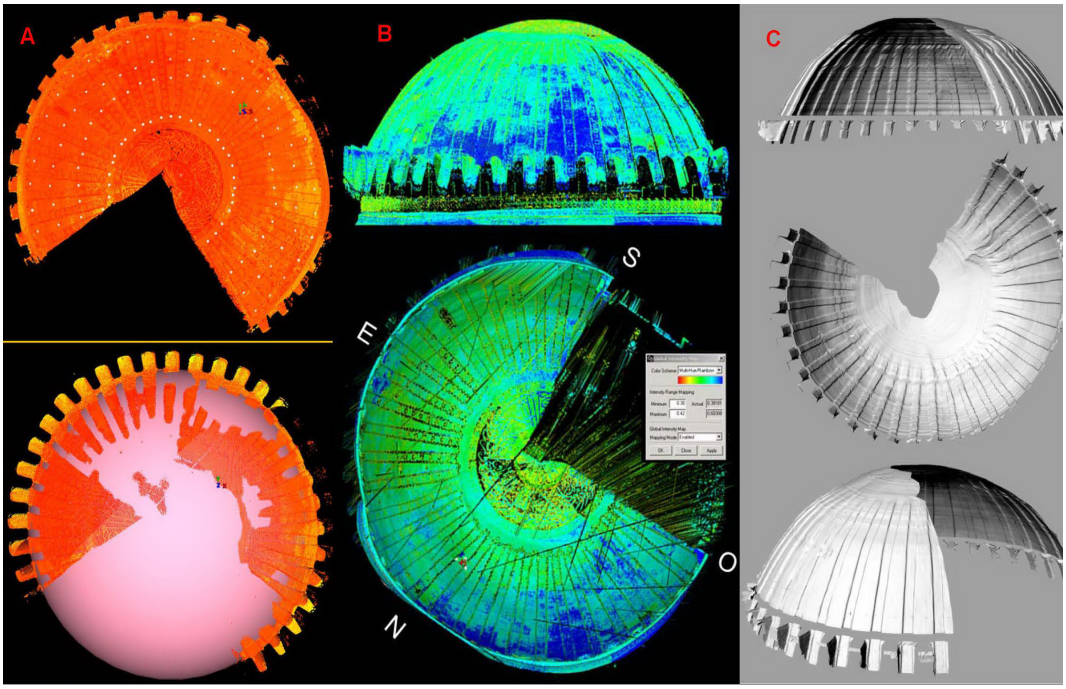


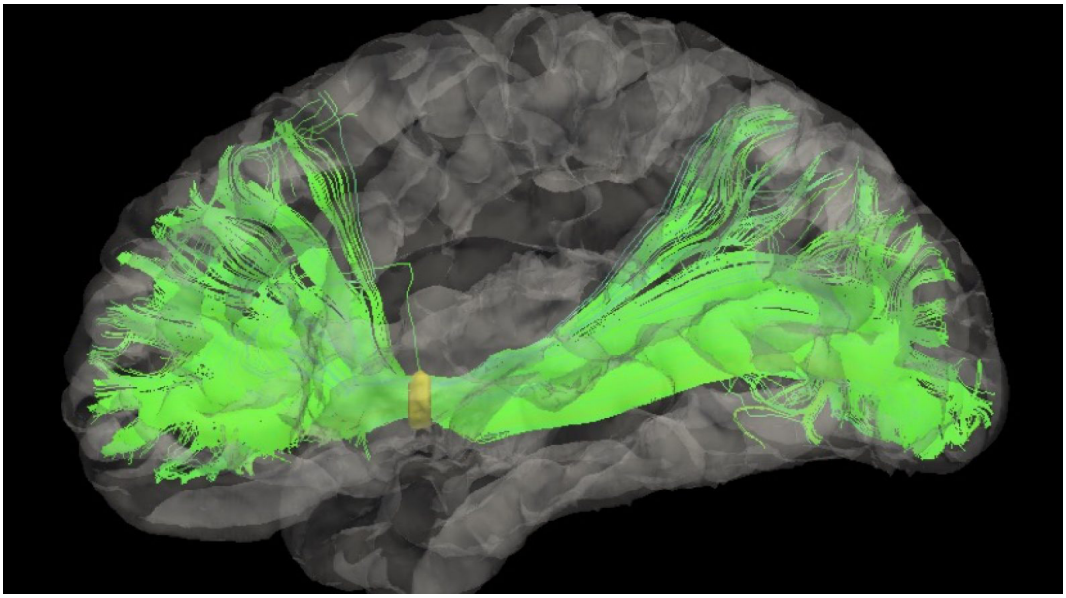
Fig. 13 Bianchini C., Haghia Sophia, surface interpolation, reflectance mapping, nurbs model.

for architecture where the possibility of considering millions of points instead of few dozens has led to more comprehensive and grounded hypothesis thanks to 3D processing (Figure 13).

A new frontier is actually in sight: data fusion. Due to their spatial consistency, 3D models are in fact increasingly becoming the geometric backbone for other information that, not necessarily spatial, can nevertheless be referred to a 3D space. The so-called Functional MRN (Figure 14) is one of the most recent examples: the anatomic structures are in this case distinguished not only with the regard of tissue typology but also of the function deployed within the same structure. Something similar pertains to the geometric positioning of diagnostic investigation for architecture (i.e. GPR, thermography, etc. Figure 15). Nowadays models are thus more and more stratified, informative and geometrically referenced.

What next then? High-end interactions using Augmented, Mixed and Virtual Reality applications: but this is another story...

Fig. 14 Functional RNM of brain, https://www.google.com/url?sa=i&url=https%3A%2F%2Fmagazine.fbk.eu%2Fen%2Fnews%2Fbrain-cancer-patient-friendly-technology-for-a-better-quality-of-life%2F&psig=AOvVaw0uL01vWpl3lrDHLcfHTI2m&ust=1591393980651000&source=images&cd=vfe&ved=2ahUKEwjW-crYkunpAhWOPKHQFoAL8Qr4kDegUIARCbAQ.



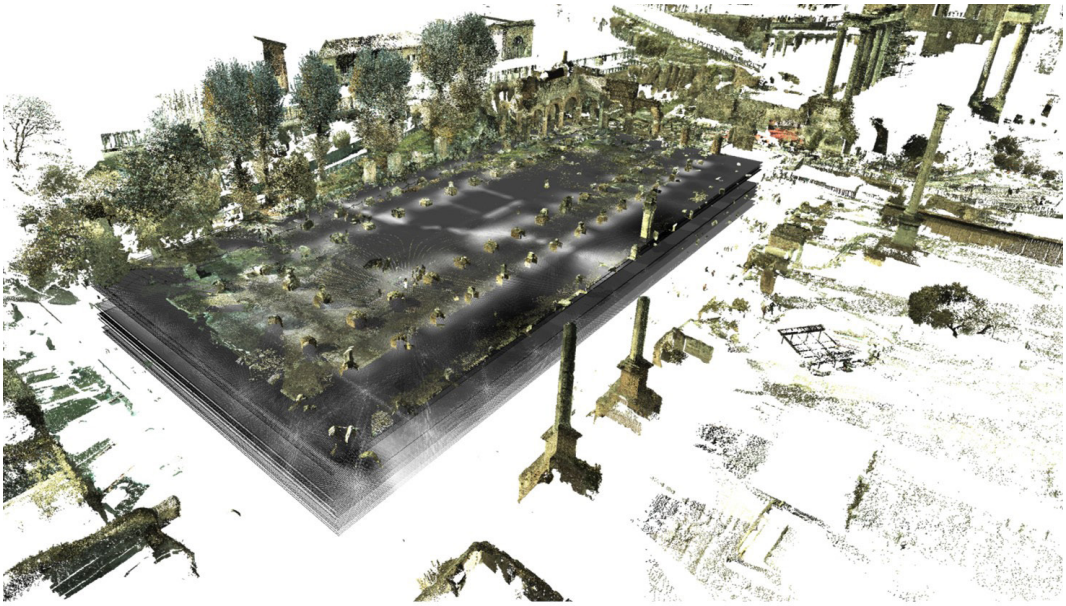


Fig. 15 Griffo M., Julia Basilica, Overlay between 3D point cloud from scanner and magnetic investigations.

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PHOTO-GRAPHIES
MEMORIES OF THE ETERNAL PRESENCE IN THE AGE OF DIGITAL MORTALITY

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ESSAY 29/02

GRAPHISM
IMAGES AS MEMORY-MACHINE
PHOTOGRAPHY
VISUAL SOCIAL MEDIA
VISUAL STORYTELLING

Visual communication has always been one of the primary forms of human expression and the re-evolution of its languages deeply marked and witnessed the world history. Moreover, since the digital era, we are leaving in between two phenomena: the so-called *société du spectacle* directly relying on images as social representation and the 'information society'. More than ever, we are living an abundance of mass picture production thanks to mobile devices, and social network devoted to visual storytelling. Nevertheless, this profusion is dramatically changing the nature of images: from timeless memory-machines to ephemeral experiences to be shared and consumed in a sort of streaming 'synopticon'. Besides, the perishable materiality of digital images, the low-resolution degradation, the absence of an 'original' and the technological obsolescence risk to erase original documentary sources forever. The paper presents and discusses the paradox the end of 'mythography' –the visual form history storytelling as we know it– and the cultural creation of the 'eternal present' due to the mortality of digital images.

'GRAPHISM' AS MEMORY-MACHINE

Many of the knowledge revolutions of human history have been arisen by innovations or, at least, a change, in the communication systems. Besides, many of these turning points have been determined by a visual language or a visual tool breakthrough. The pre-historic age images engraved, built or depicted in caves, stones, and open environment are the primary way to tell the story of tribes and population, to record their religious beliefs, crucial events or simply the daily lives. Pictures, symbols, sculptures, spatial landmarks were made to identify social belonging and cultural identities along with oral traditions (Lynch, 1960; Francescato & Mebane, 1973; Bagnara & Misiti, 1978; Bollini, 2017a, 2017b, 2011a, 2011b). Then, the concept itself of history broke into thanks to the 'chirographic' revolution. The invention of writing has been preceded by a long incubation period, according to the French archaeologist and paleoanthropologist Leroi-Gourhan, in which the complex relationship between visual and oral, manual and performative has produced a rich and original structure to tell the myths before they become historical narrations. "Indeed in primitive societies mythology and multidimensional 'graphism' usually coincide. If I had the courage to use words in their strict sense, I would be tempted to counterbalance 'mytho-logy' –a multidimensional construct based upon the verbal– with 'mythography' its strict counterpart based upon the manual. The forms of thought that existed during the longest period in the evolution of *Homo sapiens* seem strange to us today although they continue to underlie a significant part of human behavior. Our life is molded by the practice of a language whose sounds are recorded in an associated system of writing: a mode of expression in which the graphic representation of thought is radial is today practically inconceivable" (Leroi-Gourhan, 1964, pp. 195-196).

Writing –in all its forms, from phonetic to pictographic notation alphabets– is one of the most significant milestones in the way knowledge is created and transmitted. Furthermore, it is the cognitive tool which frees humankind from the

limits of memory and co-presence in time and space (Bollini, Busdon & Mazzola, 2015). As stated by Sacasas (2011): "writing reconfigures the relationship of the individual *vis-à-vis* culture; it introduces a fulcrum by which an individual may extricate themselves (to significant degree, if never entirely) from their culture. With the introduction of writing, knowledge, memory, communication, and with these the self, is situated on a trajectory that runs from contextualised to abstracted, or from associated to alienated". On the one hand, the chirographic technology creates an individual space for private stories and recordings alongside with the public and collective history. On the other hand, it creates the past and therefore the idea of obsolescence: "for it is at the moment of such transitions that the past becomes clear as a past, as obsolescent, and the future becomes clear as destiny, a challenge of the unknown" (Heim, 1986, p. 270).

However, alongside the ability to produce and share contents in the form of texts –that means a graphic transcription of the oral message, "the *dressed* word" as defined by Bruno Monguzzi (2003)– the visual language of images has developed its potentiality over centuries. Paintings, drawings and sketches –in the two-dimensional space– sculpture, bas-reliefs, volumetric and 'archigraphics' structure in the 3D world are the expressions –as in the prehistorical ages– through which people and society as a whole express and state their values, their beliefs, their symbolic meanings and their interpretation of the world.

Nevertheless, the masterpieces of art history have been often intended as an alternative language to convey and teach political, religious, and social principles and behaviours to illiterate people. In fact, the representation of reality, according to Pasolini (1969), is the act of construction and of knowledge of reality itself. The pictorial cycles depicted by Giotto in Assisi, the frescos of the Sistine Chapel designed by Michelangelo, the *Ideal city* painted by an unknown master, the *Vitruvian man* drawn by Leonardo, the Tiziano's or Goya's portraits, just to mention a few, embed the

Fig. 1 Gioacchino Rossini: the portrait painted by Francesco Hayez in 1870, Milano Pinacoteca di Brera (top), retrieved April 24, 2020 from https://www.wikiart.org/en/francesco-hayez/portrait-of-gioacchino-rossini-1870 and the photograph taken by Felix Nadar in 1856 (bottom), retrieved April 24, 2020 from https://www.alinari.it/it/dettaglio/WHA-F-010620-0000?search=e47447a72b731f6c128bbcf8a866c415&searchPos=1

ontological vision of the cultures and societies they belong to.

If a first revolution has been realised by the shift from orality to written forms of transcription, notation and recording of the speech and abstract thought, a second one is the invention of photography. This new technology gives back to the visual culture a primary role in documenting and witnessing historical facts, personal experience, famous personalities lives or intimate facts of ordinary peoples.

The first portraits –as always happen to innovations– mimic the past masterpieces and accept the iconography of the previous ages as a way to legitimate both the emerging social classes and the new technique to 'signify' reality.

As underlined by Paul Connerton in *How societies remember* (1989, p. 3) "we may note that images of the past commonly legitimate a present social order. It is an implicit rule that participants in any social order must presuppose a shared memory". According to this perspective, the pictures of the most influential personalities of his age taken by Nadar (Figure 1), draw on the portrait tradition of paintings, but, at the same time create a new imaginary and a original way to witness history.

If paintings and statues have been the power representation iconography between monarchies, aristocracy, clergy and nobility, photography becomes the visual representation of the emerging social class: the industrial bourgeois. In the 20th century, the use of photography shifted from an elitist and technically expensive medium to a powerful tool to catch and witness reality and events. From the *Magnum*'s report commissioned by the *Farm Security Administration* (FSA) to document "the great depression" caused by the Wall Street Crash of 1929 (O'Neal, 1976) in the US, to the Robert Capa iconic shot of the falling soldier (1936) of the Spanish Civil War, or the *Pulitzer* winning picture of Kim Phuc taken in 1972 by Nick Ut, the photography was assume in the mass cultural debate as a reproduction of reality (Benjamin, 1931; Lemagny, 1993). Therefore, photographs and visual documents have been considered a vital and reliable resource in historical studies. Moreover, photographs often witness and preserve memories of not-yet-told stories, as often happen when studying women history: forgotten presences in an all-male world

(Bollini, 2017b) (Figure 2). As underlined by Berger (1967, p. 8) "the photograph is about this actuality": with this statement he defines the role of indisputable proof and the powerful impact that the photo of the death body of Che Guevara (transmitted broadcast world-wide) had in the mythology of Imperialism and its self-representation through the incontrovertible truth of a picture.

Fig. 2 The development of Apple's original Macintosh: the software team photographed for *Rolling Stone* in January 1984. Retrieved April 24, 2020 from www.folklore.org. License: CC BY-NC 1.0.

DISINTERMEDIATION AND MEMORY SOCIALISATION

The evolution of technologies, the transition from plate to exposed and developed chemical films, the *Kodachrome* patent in the 1930s and the introduction of the instant camera by *Polaroid* in the 1970s have transformed photography: from a professional business to a personal and amateur activity.

This technical and cultural transition opens an extensive discussion on the statute of photography. The 'nature' of photograph has been debated from many perspectives: Walter Benjamin in his writings –about photography (1931) and the impact of industrial revolution on the art system (1936)– faces the issue both from an historical and a cultural approach.

On the one hand, photography has been considered a form of art, as cinema and other disciplines not included in the subdivision of the classical paradigm, but moreover the symptom of a changing society under the pressure both of

human evolution and the production revolution. On the other hand, it represents a collective appropriation of technological innovation, a tool to develop a "trivia" aesthetic (Sontag, 1977). The issue has been explored also by Roland Barthes (1980), who names *studium* the public, the cultural and iconographic role of the photographs and *punctum* the intimate, personal relationship that they create with our emotional experience.

Also John Berger tries to define it as other than art focusing on the concept of "property" and "rarity" according to a socio-political interpretation: "By their nature photographs have little or no property value because they have no rarity value. The very principle of photography is that the resulting image is not unique, but on the contrary infinitely reproducible. Thus, in twentieth-century terms, photographs are records of things seen". Beside, Berger shifts the question to a further level when arguing that "photographs bear witness to a human choice being exercised in a given situation. [...] The tue content of photography is invisible, for it derives from a play, not with form but with time. [...] It isolates, preserves and presents a moment taken from the continuum" (Berger, 1967, pp. 18-20). So it seems that the real nature of a diffuse possibility to take pictures is not only the illusion to testify reality but furthermore the one to crystallize time and to fix it indefinability to be preserved for the future. These theoreticians and critics could not imagine the extent that the transition from analogue to digital would have had on the previous visual culture (the first digital cameras were introduced to the mass market the late 1980s), yet they had already grasped some expectations that would have been critical in subsequent evolutions.

In the last twenty years of the 20th century, shaped by the representation that has come down to us from cinema and photography, a further technological invention changes the situation again. The information technologies revolution, the development of the first photo-retouching software (*Photoshop* was introduced in 1988) and the "next big things" such as multi and hypertextual media (Bollini, 2004; 2001) and internet gives to professionals, in the beginning, and then to amateurs new powerful tools to modify and create digital pictures.

Later on, in the first two decades of the new millennium, the communication ecosystem and the IT world have been populated by two convergent phenomena: social media and mobile devices (Bollini, 2016a) which still have a considerable impact on the redefinition of the role of images in our social culture and personal experience.

Flickr –a platform to show, collect and share mostly photographs– was firstly introduced in 2004 and appreciated among "professional-photo-amateur" (Keen, 2002). Then *Instagram* was developed for the iOS mobile system only in 2010 (the *iPhone* was launched on the market as the first mobile device in 2007) to be an exclusive application. Filters were introduced both to make up for the limitations of digital cameras and to create a recognisable aesthetic of the "new" photography (Bollini, 2017c) then the app become widely spread by the *Facebook* acquisition in 2012. The first social media entirely based on images sharing was *Pinterest*, presented in 2010, when other mass social media such as *Facebook* and *Twitter* already managed to include photos in their content streaming. The escalation of technological innovations and the dramatic change undergone by the world of photography have produced new scenarios both from the people perspective on fruition and of the structure of signification and production of the images themselves. As stated by Jaron Lanier making the point about the changes produced by IT in the field of music (disrupted by the commercial ecosystem created by the integration between the device –the *iPod*– and the marketplace), and applicable also to photography: "Making information free is survivable so long as only limited numbers of people are disenfranchised. As much as it pains me to say so, we can survive if we only destroy the middle classes of musicians, journalists, and photographers. […] And all that destruction will come surely enough if the dominant idea of an information economy is not improved" (Lanier, 2013, p. 19).

The digital revolution, in fact, has definitely disintermediated the professional system and discarded the remained gate-keepers or other obstacles to a massive selfproduction and freely-shared dynamic that involves us all as individuals and as a society. Infinite scrolls of images with no authorship and, often, quality, a continuum of picture steaming going

Fig. 3 The same stock-photo has been used in three different messages:
a) a sexual-disfunction medication
b) an Italian government's campaign to launch citizenship income initiative
c) a dental clinic advertisement.

around in our walls, granularity and recursivity of images and memes using the same shot to mean different messages have become our daily visual diet (see the surreal effect generate by the use of the same stock-photo in different context to convey different messages in Figure 3).

INSTAGRAMMED LIFES

If scarcity was not the first quality of photography, we now live in an era of abundance that seems to be almost infinite. Moreover, an abundance which questions two other issues concerning the nature and the role of pictures: their life-cycle and the presence of a source from which photos would be reprinted. With a smartphone –always– in our hand, we are less aware of the intention of taking a picture and enslaved in a vicious circle of an endless 'point-and-shoot' practice. If the real essence of a photograph was meant to be the 'intention' of the author to separate a specific moment from a *continuum* and to secure its the memory in the future, the digital photograph is an 'ephemeral *continuum*' made by a sequence to be consumed and forgotten. The act of taking a picture with real-time filters to be posted, shown, commented, liked on *Instagram* or other social media, well represents the subsequent paradox. Photos, considered a way to witness reality, are used to 'photoshop' it, to embellish or even to falsify it in an iterative process. Foods, locations, exhibits even people are requested to be photogenic, to "look good on *Instagram*".

The frontier of this phenomena is probably well represented by a sort of social experiment: the *Egg gang* (Figure 4). A picture of an egg –with no particular meaning or quality– has been

intentionally posted just to involve users in a challenge to let it become the most 'liked' in the history of the social platform.

The phenomenon has been brought to its extreme consequences by another social media: *Snapchat* who defines itself as "a camera company". "We believe that reinventing the camera represents our greatest opportunity to improve the way people live and communicate. We contribute to human progress by empowering people to express themselves, live in the moment, learn about the world, and have fun together". Its interaction model is based on pictures and short videos to be consumed in a few minutes and then to be deleted forever. Right 'here', right 'now' is the logic on which it has been built: over production, fast consumption, for ever disappearance. People do not own their picture any more: they just 'snap' and share them in a sort of 'eternal present' –as well depicted in the movie of Gondry *Eternal Sunshine of the Spotless Mind*– which gives no chance to the cultural preservation and dissemination that the history of visual artifacts has been rooted in since its origin.

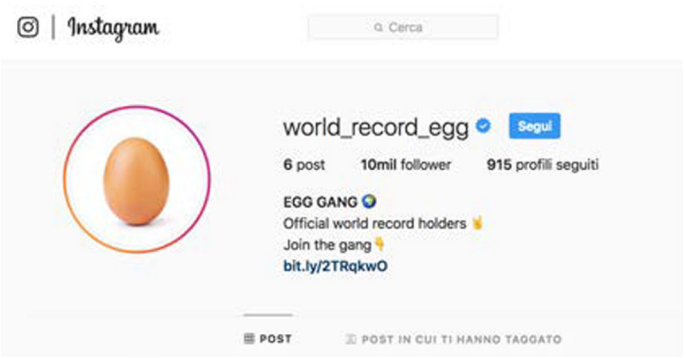

Fig. 4 The *Egg gang*: world record of a picture with more than 10 millions followers on *Instagram* (launched in 2018).

"LOW RESOLUTION" GENERATIONS

In his recent essay *Bassa risoluzione* Mantellini (2018) deals with the anthropological mutation that took place thanks to the digital revolution as the key to interpreting the contemporary world, that is, the reduction of our expectations.
Contrary to what would have been expected, in fact, the relationship between technology and the quality of our lives,

seen as a progression, has been defeated. Whether it is politics, sound or images, a degraded, low-resolution profile emerges.

The issue involves two aspects of modernity: 'public' and 'private' discourse. On the one hand we have the aesthetics of *Snapchat*, the fragment that "sees in the abstraction of memory a value higher than that of the document and its preservation" (Mantellini, 2018, p. 8) that recalls, as Maeda (2006) already stated, the "Pointillism" and "Impressionism" and the "aesthetics of blur". On the other hand, we are referring to the "transition from a society in which the story was selected through rigid and unilateral criteria to another in which the cultural ground can be seeded and watered by many different subjects" (Mantellini, 2018, p. 10).

The relationship with what Baricco (2018) calls the *Oltremondo* (Beyondworld) becomes the place where we play the new anthropology and our relationship with history and its instruments of memory and representation. It is a sort of digital copy of the real world in which everything is free, accessible, fluent. A 'double motive force' system of reality that, producing sense and experience, generates and is itself reality. In the ideal continuation of the discourse begun with the essay *I barbari* in 2006, the author further focuses on the mutation taking place in the culture of the Western world, which is not only a generational change, but "a systematic dismantling of all the mental armament inherited from nineteenth-century culture, romantic and bourgeois".

If "digital migrants" find it difficult to navigate into this new territory because they use the instruments inherited from the analogue culture of the 20th century, the new generations of digital natives –from the *Millennials* to the *Gen Z*– consider technology and its devices as an extension of themselves, a "prosthesis" (Maldonado, 1987), not something that mediates the relationship with things or the world.

The concept of intermediation emerges forcefully in the debate on the 2.0 world. The accessibility and the apparent openness of everything that the net offers us seems to open worlds previously guarded or prevented by gate-keepers. On the other hand, the transition seems more apparent than real: the presumed disintermediation idealised above all by

the 'noble' fathers of the net, Tim Berners Lee *in primis*, has translated, in fact, into a change of intermediaries. Many authors have proposed critical reflections, when not alarmist, on the new conceptions of power, the informative and relational bubbles or the manipulation operated by algorithms, from Lovink (2008) to Russo & Zambardino (2009), from Metitieri (2009) to Lanier (2018).

The two critical strands that prevail in this debate have at their core two crucial issues: our relationship with reality, and the relationship between reality and digital.

Especially in the latter we play the role and meaning that images have, as a reproduction of reality, and their ontological status when they have become virtual themselves.

EPHEMERAL VS 'DATAFICATION'

Nevertheless, one of the biggest contradiction of our "onlife" (Floridi, 2019) experience is the relationship between ephemerality and duration, i.e. instant and forever fragmentation of our life.

> "*Un ulteriore tema classico, quello della presenza nel tempo, esaminato da un caso particolare significativo: quello dell'identità diacronica, che è reso tano più urgente, rilevante e problematico quanto più le odierne tecnologie digitali dell'informazione e della comunicazione creano le condizioni per differenti forme di costruzione dell'identità nel tempo.* […] *Ci sono, infatti, alcuni problemi classici riguardo all'identità personale che occorre aggiornare alla luce della rivoluzione dell'informazione. Questi problemi sono legati alla continuità nel tempo o entro determinati scenari futuri possibili.* […] *La libertà di costruire le nostre identità personali online non è più la libertà di anonimato.* […] *Piuttosto si tratta della libertà che associamo alle idee di autodeterminazione e autonomia. Non si può mentire cosi facilmente quando milioni di persone ci guardano. possiamo fare certamente del nostro meglio, però, per mostrare loro ragionevolmente chi potremmo o vorremmo essere, e ciò racconterà una storia differente al nostro riguardo che sul lungo periodo influenzerà chi siamo*

sia online sia offline. Per questo l'esperienza onlife è un po' come la 'creazione del pensiero degli altri' di Proust, ma con noi come coautori" (Floridi, 2019, pp. 70-71).

According to Floridi, it seems that the onlife world could be embellished, but not totally falsified because being under others scrutiny. To be regarded. To be under the public gaze through social platforms –Floridi mentions *Facebook*, *LinkedIn*, *Youtube*, *Flick'r* and *Instagram*– and their visibility reconfirm the apparent value of words and above all images as a reality surrogate. Images create the imaginary of our connected society that exists only when it is under our eyes. This tendency is confirmed by the growth of two different phenomena. On the one hand, the desire to fix every instant of our existence thanks to a continuum of images. It is the case of the visual "life-logging" (Öhlén, 2013) of *Memoto Narrative Clip*, a micro-camera able to take a photo every 30 seconds or Autographer (Coldwell, 2014), a wearable one, that create a 'narrative' of everyday life and software such as *Narrative* (2016) aimed to record and document automatically our lifes using the photo-camera to be shared. Human life is therefore dispossessed of one of its fundamental skills by the machine. The ability to create memory. To choose and discriminate what remains ephemeral, confined to the present, and what becomes memory and therefore history. This choice, according to Berger (1967), is the founding and conceptual act of photography. The border between real and virtual life (Bauman, 2014) is crossed by the reduction of people into (their) data. The 'datafication' –the data processing of the existence– and thus the continuous tracking and recording of information finds its supporters of 'transhumanists' such as Kay Kurtweil, *Google* engineer, inventor and futurist, author of *How to Create a Mind: The Secret of Human Thought Revealed* (2012) a book about artificial *super*-intelligence. A position that, in the long term, leads to *syn*opticon –opposite to the *pan*opticon– in which buildings and space have been replaced by cameras and continuous visual and media exposure, as underlined by Chiusi (2014).

If algorithms are meant to record every aspect of human lives to create big-data base on which every experience is customised, on the other hand, memories, then become an issue

in in the contemporary world. When everything is recorded, what's the role of remembrance, one of the most peculiar activity of humankind (Morin, 2015)? The question as been widely explored in novel and movies. In particular, the broken relationship between memories and experience is at the base of many dystopian plots. The leitmotiv is often the intimate connection or the falsification of what we think we had lived. The movie directed by Michel Gondry, *Eternal Sunshine of the Spotless Mind* (2004), the novel *Recursion* written by Blake Couch (2019) or the episode *Dangerous memories* of *Black Mirror* created by Charlie Brooker investigate and unveil the dissonance between a transient present and an artificial memory that loses its primary role, that of intimate elaboration of one's own experience, and with it the role of the image as a documental and documented fragment of that experience.

MEMORY, FOOTSTEPS AND SIMULACRA

According to the *Documentality* theory proposed by the Italian philosopher Ferraris (2009), the communication society is a documentation society. However, in his idea, the cultural reference is still 'writing' understood as a form of recording and, consequently, of finding the documentary or the link between the society and its traces. The crucial point, however, is the possibility of inscribing and preserving these 'social objects', whether they are real or digital, in order to be able, in the future, to retrace backwards the path done. In a society of images, based on highly visual communication tools and the role of traditional witness attributed to photographs leads us to ask ourselves about the change in the relationship between the image, its referent and the represented and its future communicative and testimonial value.

Mitchell, in the chapter dedicated to the realism of the photographic image and its relationship with the digital one, reproposes in a critical way precisely this assumption, that is, how much the image is a copy –"analog"– with respect to its referent. The suggested doubt is that the more the manipulation of the analog shot is difficult and complicated, the less it

Fig. 5 A fake pictures of Gal Gadot: her face has been superimposed on the body of a porn star by the *Tensorflow* software developed by Google, an algoritmo of machine learning: *Deepfake app*, 2018

is that of a digital shot, thanks to software within everyone's reach, such as *Photoshop* for instance. And that the imperceptibility of the 'spectrum of manipulation' to question 'all' digital photographs. He states, in fact: "these examples are called to weaken or at least question the predominant myth that digital photography has a different ontology than that based on chemical processes. and that this ontology imposes a different relationship with the referent, based on information,codifications and sets of signals (symbol dimension) rather than on the iconic and indexical dimensions of traditional photography. [...] it is based on the false belief of a misplaced concreteness, a type of vulgar technical determinism that believes that the ontology of a medium is adequately determined by the importance of its materiality and its technical-semiotic character" (Mitchell, 2017, pp. 199-200).

If the digital image carries within itself a kind of mistrust of its truthfulness and credibility and yet, most of our traces and textures are photos and selfies what 'narrability' do these tools offer, both present and future? In addition, if they are also manipulable over time, overwritable, falsifiable: what story will it be possible to tell? Or what happens if the technology in its next evolutions will be able to manipulate autonomously our images without that we are aware of it, as in the case of the photo editing made by a software based machine learning *Deepfake app* (Figure 5) intentionally programmed for that purpose?

As Baudrillard points out, in fact, the simulacrum is not something that hides the truth, but it is itself true: "Today […] the simulation is no longer that of a territory, of a referential entity, of a substance. Today, it generates, through the models of a real without origin or reality: it is hyperreal, the territory no longer precedes the paper, nor survives it. Here and there are vestiges of the real that subsist, and not of paper […] The desert of the real itself" (Baudrillard, 2008, pp. 59-60).

THE END OF THE (HI)STORY: THE ABUNDANCE OF PARADOX

The second issue, already mentioned above, is the relationship between the original or, the source –when shifting in the digital perspective– and its reproduction and the possibility of its preservation along time. The risk of this approach to material preservation is to face the paradox to hand down to posterity virtual copies, images or –better to say– *simulacra* of the originals without surviving connections with their original dimension. Copies without originals, as underlined by Falcinelli (2014) about the production of graphics and visual contents, in the digital media scenario, in contrast with the issue raised by Benjamin of the industrial reproduction of unique (art) pieces. "The debate about the relationship between the original and its copy, the original and its digital copy remains open, and increasingly critic if considering the problem of digital obsolescence and the loss of data according to the entropy of information source principle of the information theory" (Shannon, 1948, p. 382). Is a matter of fact that the technological evolution and its discontinuity of formats, standards, devices and data support sometimes become disruptive in front of the necessary continuum in the conservation field. The risk is to come to a paradoxical situation in which data are stored but no longer 'usable' because of a technological gap: something that is already happening with interactive CD-Roms of the 1980s, web sites and interactive online applications developed in *Flash* of the 1990s and early 2010s or with magnetic storages" (Bollini, 2016b, pp. 774-75).

As stated by *Google* engineer Vincent Cerf at the *American Association for the Advancement of Science's* annual meeting in San Jose, California in 2015, we would miss an entire century or more in the next future: "We are nonchalantly throwing all of our data into what could become an information black hole without realising it. We digitise things because we think we will preserve them, but what we don't understand is that unless we take other steps, those digital versions may not be any better, and may even be worse, than the artefacts that we digitised. If there are photos, you really care about, print them out" (Sample, 2015).

On the opposite, a whole generation is growing up with the myth of overexposure and disappearance, at the same time, as an existential condition. It is producing and consuming the most massive amount of pictures and data never produced before in the entire previous history of humanity, and it is unconsciously making an anthropological leap of discontinuity. Memories and photos have become public, social and massive, but as Berger wrote "if everything that existed were continually being photographed, every photograph would become meaningless" (Berger, 1967, p. 18).

CONCLUSIONS

According to the essay written by Bill Viola (1990) *Video black. The mortality of the image* –firstly appeared in book *Illuminating video. An Essential Guide to Video Art* edited by da Doug Hall, Sally J. Fifter, David Ross with David Bolt– images are the metaphor which helps us in reading the profound change of being. The timeless icons depicted in the Middleage –both in East and Western culture– "unlike the mass media images of contemporary culture, aimed at consumption, [the icons] preserve their importance remaining unchanged over the centuries. Giving shape to eternal realities, they conform themselves to the eternity itself". On the contrary, photography gives physical shape to images delivering them to an inherent temporality. The virtual (un)substantial of the digital photographs seems to resonate with black, the absence of light –the material of which photography

is made– a state of beyond-death, the limes between the emptiness and its opposite.

The same condition we are experiencing living in an abundance of digital images that are leaving no physical traces behind themselves.

Nevertheless, I would like to conclude with a positive quote taken from Lanier: "As long as we remember that we ourselves are the source of our value, our creativity, our sense of reality, then all of our work with computers will be worthwhile and beautiful".

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THE LABYRINTHS OF PETER SÍS

PICTURE BOOKS TO TRAVEL THROUGH SPACE AND TIME

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PICTURE BOOKS
MAPS
VISUAL CULTURE
GRAPHICS FOR CHILDREN
SPATIAL EDUCATION

This essay assumes the concept of the labyrinth in a broad sense, as a picture, as a symbol and as a geometric structure, but also as a narrative structure and as a metaphor: the labyrinth of History, the labyrinths of the mind, the labyrinths of life. The study takes into consideration the special relationship that links spatiality and identity in the Czech-born American artist Peter Sís's work and examines a selection of the many 'labyrinths' present in the author's biographical and autobiographical picture books, which seem designed to make the reader travel in space and time and to take him off the usual routes.

Sís's illustrations actually seem to be imbued with the mentality of the time the story is set in, furthermore telling biographies far away in time or stories that take place in distant lands, the author invites his young readers into the meanders of personal and collective memory. Moreover, Sís's books can be considered a means to introduce young readers to topological structures, projective forms and the codes of cartographic language, a means to develop their spatial and reading and prefiguration skills.

INTRODUCTION

Landscapes, cities, buildings and more in general references to space both narrative and iconic are very frequent in children's literature. In picture books where iconic and textual languages are inseparable, these representations take often a fundamental role in storytelling and predominant graphic relevance. The topic has mainly been considered in literary and pedagogical studies but also represents an emerging field of inquiry for geographers (Kümmerling-Meibauer & Meibauer, 2015; Goga & Kümmerling-Meibauer 2017; Gollapudi 2010; Meunier 2016, 2017; Pavlik 2017, Patton & Ryckman 1990). The ongoing research indicates that picture books are a basic source for childhood education in spatial and geographical thinking. Actually, by relating with children's real spatial experience, texts and images assume an important role in the construction of the idea of space and dwelling in young readers. Pictures eventually become the primary vehicle by means of which considerations on space and the relation between individuals and their surrounding environment are offered.

French geographer Meunier has dedicated extensive studies (Meunier, 2016) and an online *carnet de recherche* (research notebook) entitled *Les territoires de l'album* (The territories of picture books) to the issue. Meunier (2016) explores picture books from the perspective of cultural geography and assets that illustrated children books do not just 'transmit' space, but also 'generate' space, create new spaces by means of their system of texts and images. According to him picture books are a privileged place for children's encounters with representations of the surrounding territory, city and architecture that connect them with the implications of the drawing of space within an extraordinary variety of expressions. These implications moreover are not only cultural, but also symbolic, semiotic and geometrical.

Meunier (2015) defines Czech-born American artist Peter Sís a "*voyageur en images*" ("traveler by images", p. 17), in

his books, in fact, the representation of space is important and closely related to the narrative. Moreover, in Sís's illustrations it is possible to glean a passionate interest in the spatiality, forms and details of architecture, cities and landscapes. The reproduction of existing cities and landscapes of the present and past is accurate, even if often accompanied by hybridisations, transfigurations and symbolic or psychological interpretations. According to Latham (2000) Sís's books are also a stimulus to observation, definitely they "are sophisticated, detailed, and filled with symbols and allusions; as such, they encourage and reward careful observation" (p. 179). Indeed, these works present an extraordinary repertoire of spatial representations and bear witness to a rare degree of attention towards geographic and architectural perspectives. Moreover, Sís's drawings demonstrate a knowledgeable and precise use of the codified forms of spatial representation and their continuous personal and expressive reinterpretation.

The theme of the labyrinth often appears in Sís's stories and illustrations. This essay assumes the concept of labyrinth in a broad sense, as a picture and as a symbol, as a geometric and spatial structure, but also as a narrative structure and as a metaphor: the labyrinths of History, the labyrinths of the mind, the labyrinths of life. In the first part, this essay takes into consideration the special relationship that links spatiality and identity in the Sís's stories and outlines the field of investigation and the resources taken into account. In the second part the text examines a selection of examples of the many 'labyrinths' present in the author's artworks and the 'maps' that he provides his characters and the reader to get out of them. This sort of short 'atlas' essentially highlights some recurring types of labyrinths. By analysing texts and illustrations, it gradually emerges how focusing on this topic can be a stimulating way to investigate the special spatiality of the Sís's picture books.

SPACE AND IDENTITY

Filmmaker, muralist, illustrator and writer Peter Sís was born in Brno in 1949 and moved to the USA in 1982, where he lives and works to this day. His personal life, as well as his childhood and teenage years, marked by the climate of totalitarian oppression of the Communist regime and Soviet influence, is deeply present in his works (Parmegiani, 1997). Sís often chooses main characters who share his dream of escaping and asserting themselves from a hostile environment. In his books, particularly biographical ones, he describes the lives of his characters as a labyrinth of open possibilities and barred paths, through which everyone pursues his dream. The reader follows the protagonist in his adventures, gets lost following his difficulties and failures, but then finds his way back when the character finally manages to assert the destiny he has chosen.

The theme of the journey is very important for Sís who has also been called "artist of wandering" and "migrant geographer" (Meunier 2015, p. 288). His stories indeed portray travelling as an experience leading to discovery and freedom, a concept that dominated his whole youth spent within the boundaries of the regime and lived, throughout his childhood, through his father's trips on the other side. According to Cantavella (2017a) "the profusion of maps found in in Sís's biographical picture books expresses an understanding that the exploration of identity is intimately linked with the exploration of the spaces in which that identity is formed" (p. 39). In his works, space and time are inextricably bound (Cantavella, 2017a, p. 49), moreover, descriptions of places and their connection with his characters' stories is particularly significant. For this reason, as we shall see, it has been said that Sís carries out a 'spatialization of identity'.

Within Sís's extensive body of work, here the focus will be on those where he appears as both author and illustrator,

and particularly his biographical and autobiographical ones. Four volumes have been examined telling the lives of Christopher Columbus (*Follow the Dream*, 1991), Galileo Galilei (*Starry Messenger*, 1996), Charles Darwin (*The Tree of Life*, 2003) and Antoine de Saint-Exupéry (*The Pilot and the Little Prince*, 2014). In addition, three autobiographical works dedicated to Sís's childhood and youth have been considered. Two of these are set in Prague, i.e. *The Three Golden Keys* (1994) and *The Wall, growing up behind the iron curtain* (2007). In the third one, *Tibet Through the Red Box* (1998), the author recounts his father's experiences in Tibet during the 1950s, referring to his father's long-hidden diary.

In all these books the theme of the labyrinth appears several times, sometimes explicitly, with the traditional iconography of the maze, other times in the labyrinthic transfiguration of real spaces, others indirectly, in the structure of the story or even in the graphic structure of the pages.

Actually in order to inquire into the matter of the representation of space it is necessary to take the book-object itself into consideration by analysing its narrative structure, format, graphical composition, etc. Sís also shows particular attention to the use of space in the relationship between words and text and in the composition of the page. As Latham (2000) observed Sís uses paratextual elements and multiple formats, moreover he merges text and pictures to achieve synergy and places sentences in such a way as to form shapes and to transform words in pictures. This way his pictures and texts interact with each other, and they invite the reader to interact with them.

PETER SÍS'S LABYRINTHS

Whether it is a place or a system of places, the labyrinth can be considered first and foremost a geometry; more precisely, a geometry of topological character, in the sense that it is based on notions such as those of frontier, order, continuity,

inclusion, and lends itself to homomorphic transformations without alteration of structure. From a geometrical point of view, the labyrinth is a space in which the relationships of continuity and contiguity are dominant: the different parts relate only to those contiguous, connected or accessible to them (Ugo, 1991, pp. 152-153).

The labyrinth is therefore an essentially topological space, although it can be represented graphically in many ways. Typically, it is portrayed with a plan, but it can also be represented with a scheme, or even a perspective or an axonometric projection. It can be simply a drawing, a grapheme, but it can also be a building or a garden or even a larger area. Sís's drawings often represent mazes or contain mazes (Figure 1) and frequently the artist draws real spaces (city plans, gardens, landscapes) as if they were mazes, transfiguring them (Figure 2). In his illustrations space is transformed in many ways, introducing incongruous elements, interlacing real space and perceived space, real places and places revisited by memory, creating endless hybridizations and metamorphoses. Real and imaginary intertwine to tell the characters' experience of the places. In these drawings the forms of the representation are used with great freedom and inventiveness: Sís resorts from time to time to orthogonal, parallel, perspective projections and also to non-projective representations, such as diagrams and graphs. These different ways of representing space are then

Fig. 1 Fig. 1 Peter Sís, *Tibet Through the Red Box* (1998, pp. 26, 36). The Potala Palace in the center of Lahsa (on the left) and a maze-like garden (on the right).

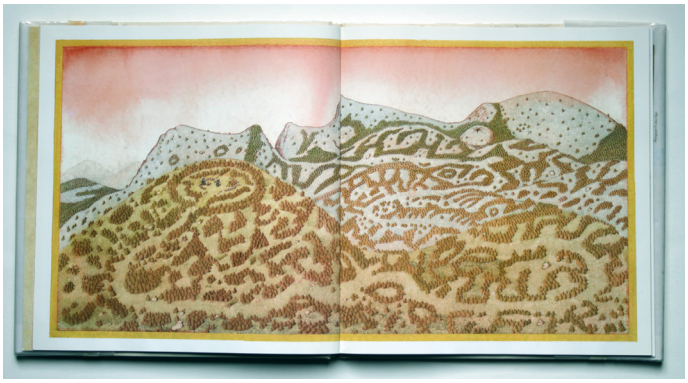
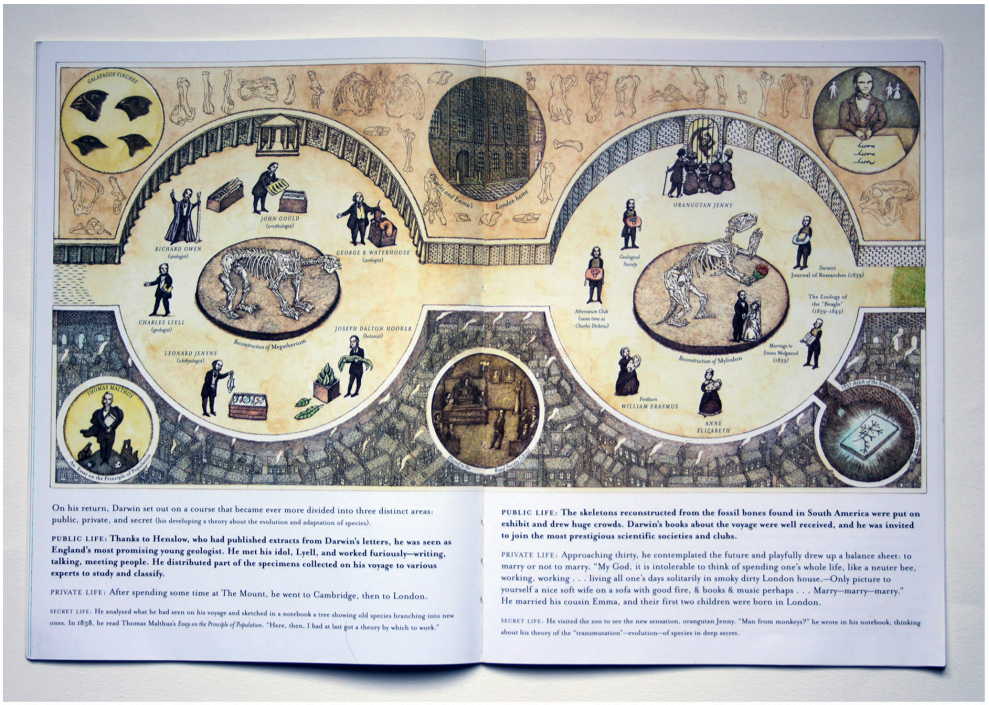


Fig. 2 Fig. 2 Peter Sís, *Tibet Through the Red Box* (1998, pp. 22-23). Mazes-like landscape.

often combined, hybridized too, giving rise to imaginative and fascinating, but also unusual and enigmatic, creations.

Telling biographies far away in time or stories that take place in distant lands, Sís invites his young readers into the labyrinths of space, time, and the meanders of personal and collective memory. Perhaps also for this reason in his books there is a profusion of images to help the reader find his way around geography, history, events of an epoch or of a character, such as aerial views, cartographies, schemes, family trees, geographical and cognitive maps (Figures 3, 4).

As we have seen, the characters of Peter Sís have in common the experience of the trip as an objective biographical event (Darwin's voyages of exploration, Saint Exupéry's flights, trips among the stars of Galileo, just to name a few). However, the journey can also be understood as a metaphor for the search for one's own destiny, as an affirmation of one's own idea and as an exercise of personal freedom. This recurring theme, as has been said, is clearly linked to the personal story of the author. In the long interview reported in Host's essay (1996), Sís says he used the drawing to travel since childhood: "if there were places I couldn't go, I could at least draw them" (p. 47). Moreover, the journey for him is not only a crossing of space, but also an exploration of thought. In the work dedicated to Galileo, for example, Sís tells of a man who goes even further than the great explorers just by means of his thoughts and goes as far as an unknown world that is entirely the fruit of his brain (Host 1996, p. 52).



On his return, Darwin set out on a course that became ever more divided into three distinct areas: public, private, and secret (his developing a theory about the evolution and adaptation of species).

PUBLIC LIFE: Thanks to Henslow, who had published extracts from Darwin's letters, he was seen as England's most promising young geologist. He met his idol, Lyell, and worked furiously—writing, talking, meeting people. He distributed part of the specimens collected on his voyage to various experts to study and classify.

PRIVATE LIFE: After spending some time at The Mount, he went to Cambridge, then to London.

SECRET LIFE: He analyzed what he had seen on his voyage and sketched in a notebook a tree showing old species branching into new ones. In 1838, he read Thomas Malthus's *Essay on the Principle of Population*. "Here, then, I had at last got a theory by which to work."

PUBLIC LIFE: The skeletons reconstructed from the fossil bones found in South America were put on exhibit and drew huge crowds. Darwin's books about the voyage were well received, and he was invited to join the most prestigious scientific societies and clubs.

PRIVATE LIFE: Approaching thirty, he contemplated the future and playfully drew up a balance sheet: to marry or not to marry. "My God, it is intolerable to think of spending one's whole life, like a neuter bee, working, working . . . living all one's days solitarily in smoky dirty London house.—Only picture to yourself a nice soft wife on a sofa with good fire, & books & music perhaps . . . Marry—marry—marry." He married his cousin Emma, and their first two children were born in London.

SECRET LIFE: He visited the zoo to see the new sensation, orangutan Jenny. "Man from monkeys?" he wrote in his notebook, thinking about his theory of the "transmutation"—evolution—of species in deep secret.

PUBLIC LIFE: Darwin threw himself into his work to forget his grief over the death of his third child. To FitzRoy, he wrote: "My life goes on like clockwork and I am fixed on the spot where I shall end it." He continued a prolific correspondence—writing and receiving more than 15,000 letters in his lifetime—exchanging ideas, mostly with men of science.

PRIVATE LIFE: In 1842, the Darwins moved from London to Down House in the village of Downe in Kent. A daughter was born just days after they moved in, and died three weeks later. Darwin was grief-stricken. He constructed his "Sandwalk," on which he took his daily walks—thinking, thinking, thinking.

SECRET LIFE: He had to share his secret with somebody and chose Joseph Dalton Hooker. He also confessed to Emma. Then an anonymously published book, *Vestiges of the Natural History of Creation*, suggesting that people were descended from fish, created such an uproar that it sent Darwin back into hiding. He knew that his ideas might invite the same anti-evolutionary furor.

Still, he kept on researching and pondering. All of his previous reading, all of his studies, along with the reports from the scientists who were classifying his specimens, were coming together to help him shape his theory. He wrote to Hooker:

I have been now ever since my return engaged in a very presumptuous work & which I know no one individual who would not say a very foolish one—I was so struck with distribution of Galapagos organisms, &c . . . that I determined to collect blindly every sort of fact, which could bear any way on what are species.—I have read heaps of agricultural & horticultural books, & have never ceased collecting facts.— At last gleamce of light have come, & I am almost convinced (quite contrary to opinion I started with) that species are not (it is like confessing a murder) immutable . . . I think I have found out (here's presumption!) the simple way by which species became exquisitely adapted to various ends.—You will now groan, & think to yourself, "an what a man have I been wasting my time in writing to."—I should, five years ago, have thought so.

Fig. 3 Previous page: Peter Sís, *The Tree of Life: Charles Darwin* (2003, pp.28-29). Double page spreads explaining the public, private and secret life of Darwin.

Fig. 4 Peter Sís, *The Pilot and the Little Prince* (2014, pp. 10-11). Cognitive map explaining Antoine de Saint-Exupéry's childhood.

The strong emotional bond that links the protagonists of the stories to the places leads the reader to identify with and immerse himself in these representations of faraway territories, mysterious cities, fabulous landscapes and fascinating architecture (Figure 5). In order to orient himself in this complex imagery, the reader has at his disposal not only the thread of the story but also the numerous references to History and real places that are described and portrayed with great precision. The illustrations of Sís –as Host (1996) suggested– are texts to be decrypted, whose vocabulary is made of characters, buildings, bricks and stones (p. 36). Reading his books

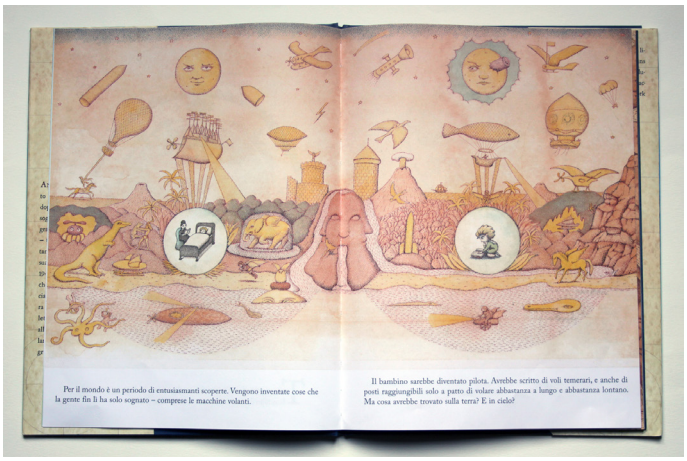


Fig. 5 Peter Sís, *The Pilot and the Little Prince* (2014, pp. 8-9). Landscape. "For the world is a time of exciting discoveries".

therefore means continuously getting lost and finding oneself, in time and space, sure enough his imagery contains a maze of labyrinths in which to get lost, but at the same time also a repertoire of maps to find your way back. Besides we must not forget that a labyrinth is essentially a challenge, a game and that after all, all labyrinths are of a playful or initiatory nature (Ugo, 1991, p. 152).

PRAGUE AND OTHER MAZE-LIKE CITIES

The book where the theme of the labyrinth appears more explicitly is *The Three Golden Keys* (1994). Significantly, it is a work strongly linked to the personal story of Sís and to the memory of his childhood and family. Indeed the book comprises the story of travelling on three different levels: it consists, in fact, in a stroll through the author's hometown, a journey through Bohemia and its legends, and in an interior voyage backwards in time in search of one's own roots (Meunier, 2015, p. 143). It tells the story of a man (obviously the author) who returns to his hometown that looks at first desolate and empty. He has to find three golden keys to open his childhood home, once the door of memory is opened, the city will return to life.

In the first part of the story the city, seen from above, appears strangely silent and its streets are deserted. As Host (1996) noted, Prague hides, is mysterious, and unlike the other cities in the world watched by tourists, it is she who seems to be watching the reader. The French writer describes the town as follows: "*c'est encore un indescriptible entrelacement de toits et de façades –désordre visible–, et bientôt, les échappées d'un labyrinthe –ordre secret que l'on devine*" ("it's still an indescribable intertwining of roofs and facades –visible disorder– and soon, the escapees from a labyrinth –secret order that we can guess", p. 24). Prague does not offer itself fully, you have to conquer its keys that can only be found by venturing through un-

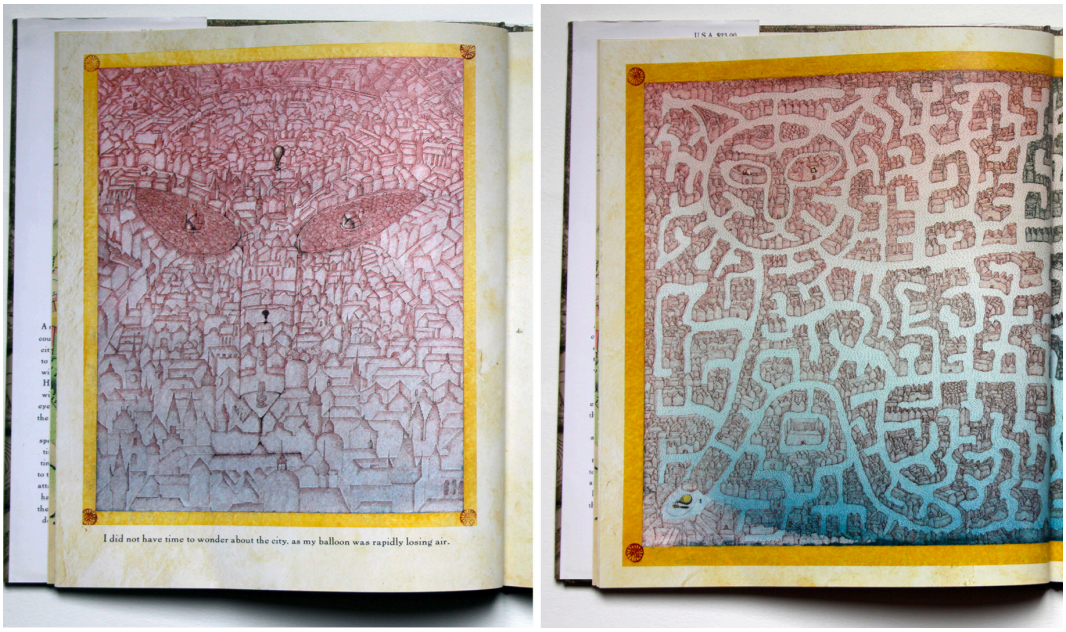


Fig. 6 Peter Sís, *The Three Golden Keys* (1994, pp. 14, 16-17) Pictures showing desolate Prague.

known streets and squares and immersing yourself in its past full of legends and mysteries. In the third map of the city that appears in the book, the streets form an inextricable maze and the narrator is invaded by the anguish of no longer recognizing or remembering places (Figure 6). In the tangle of streets and squares takes shape a cat that will turn out to be the guide that will accompany the protagonist in the journey through the city and through his childhood memory. In the following pages, the city gradually becomes comprehensible and recognizable again, the labyrinth melts away, the dreamlike city transfigured by the anguish of the protagonist gives way to the real city (Figure 7). This path of the protagonist through the labyrinths of the city and memory is clearly a path of initiation, marked by trials, as it happens in legends, but also in the existential path of each one. It is no coincidence that the author dedicates the text to his daughter, born in another country, with the intention of giving her back a piece of her story (Sís, 1994, p. 10).

Fig. 7 Peter Sís, *The Three Golden Keys* (1994, pp. 14-17). The protagonist walking in the streets of his childhood.

In *The Wall: growing up behind the iron curtain*, the book that recounts the author's youth, Sís (2007) again transfigures his city, transforming it into a maze. In the picture that describes the entrance of Soviet tanks into Prague in 1968, the city is represented as a circular labyrinth invaded by small red rectangles that penetrate into its heart,

infesting every street, every square like a virus (Figure 8). The bewilderment of the protagonist is suggested by a formless human figure holding his own screaming portrait, in an explicit game of cross-references with Munch's famous painting. Once again, the expression of a state of mind linked to a particular experience of a place and the way this place is portrayed are closely connected.

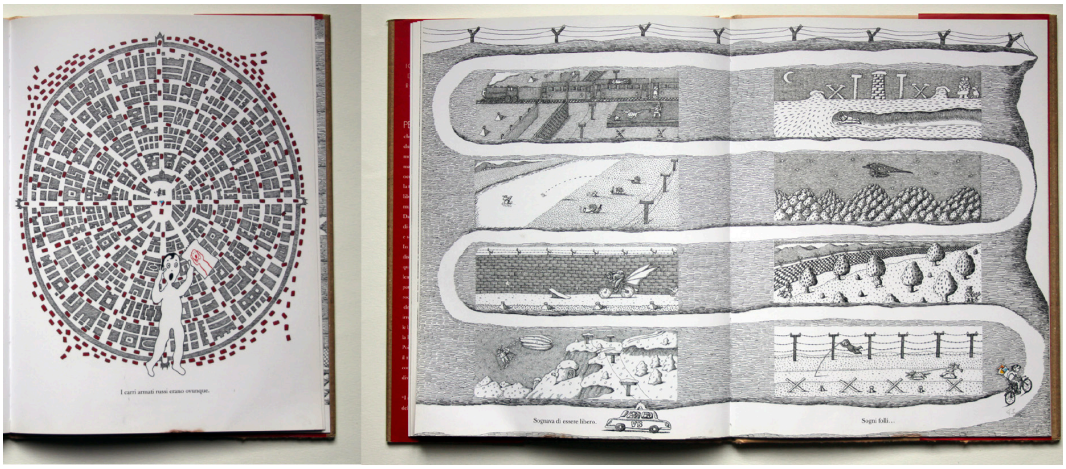


Fig. 8 On the left: Peter Sís *The Wall: Growing up Behind the Iron Curtain* (1997, p. 29)."Russian tanks were everywhere".
On the right: Peter Sís *The Wall: Growing up Behind the Iron Curtain* (1997, pp. 44-45). "He dreamed of being free. Crazy dreams...".

At least on another occasion Prague is iconicised in a labyrinth and once again in an autobiographical tale centred on the relationship between places and affections. In *Tibet Through the Red Box*, the book's endpapers show the silhouettes of two faces looking at each other and separated by the sea or a river. Latham (2000) observed that "the eyes in each face appear to be an aerial view of the city –two different cities– that seen from above have a maze-like quality" (p. 184). Following the author, the cities are Prague and a city in which the father lived for a time (Beijing or perhaps Lahsa), besides the two faces represent Sís and his father gazing each other through the time and the maze and the river suggest the journeys. And again, Lahsa appears in the form of a labyrinth in another picture, with the Potala Palace in the center, magnificent, imposing and unreachable: "my father reached Potala to find it surrounded by a sea of military tents.

He had no idea how to get in. Then he notices a cut here, a cut there, in a shrub, the grass, a leaf, a tent. The cuts showed him a path through the camp" (Sís, 1998, p. 51. Figure 1). And so, with difficulty, the father manages to reach the palace and later crossing its thousand magical rooms he realizes that "it was all here, recorded on these walls, the past and the present. In that short moment, I think my father became who he is today" (Sís, 1998, p. xx. Figure 9).

Fig. 9 Peter Sís, *Tibet Through the Red Box* (1998, pp.40, 51). Mandalas.

METAMORPHOSIS

In the images of Sís often the landscape, the cities, the buildings take on anthropomorphic or zoomorphic features (Figure 6).

For instance, in *The Pilot and the Little Prince* Saint-Exupéry is stuck in New York that seems oppressive and alien to him, the elongated 'body' of the Manhattan Island surprisingly turns into a crocodile. In the drawing along the edges of the island the skyline of the buildings overturned on the floor suggests the scales and sharp teeth of the animal, moreover the bridges connecting it to the mainland become its stumpy paws (Figure 10).

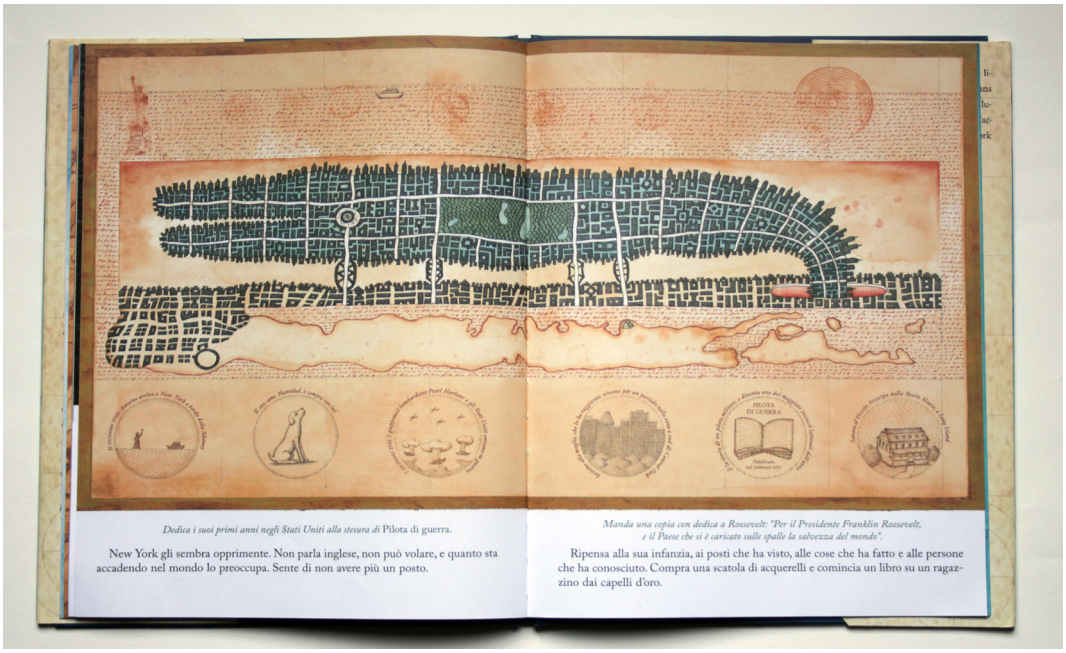


Fig. 10 Peter Sís, *The Pilot and the Little Prince* (2014, pp. 36-37). New York map.

Besides in *The Three Golden Keys* mysterious faces and animals constantly peep out and observe the reader from the palaces, trees, streets, facades and from the very plan of the city of Prague. As Latham (2000) observed, "several illustrations show Sís walking through the city, with his memories illustrated as ghostly drawings overlaid on the more realistic pictures of the streets of Prague" (p. 186. Figure 7). According to Host (1996) these evanescent figures represent the time, the past (of the city and the protagonist), they are shadows that come from legends, from our memories and our imagination and you should not be afraid of them if you want to find the key to the labyrinth (p. 24).

In other cases, the metamorphosis takes place in the landscape, especially when the author chooses to use a bird's eye view to represent it. The territory then transfigures itself as when we observe the earth from above and we seem to catch a glimpse of human or animal forms in the landscape's features (Figure 11). In *The Pilot and the Little Prince* the coasts of Africa overflown by Saint-Exupéry with his airplane take the

shape of a human being. "In this way Sís emphasizes the importance of knowing the geographical layout in those early years of aviation, when maps where scarce and often imprecise. Here, we see an entirely unreal vision of the landscape, a kind of labyrinth that turns the protagonist into an explorer" (Cantavella, 2017a, p. 49).

The examples of metamorphosis of real spaces contained in the books of Sís are actually numerous and allow the real and the imaginary to intertwine with countless solutions to tell the experience of space lived by the characters.

Fig. 11 Peter Sís, *The Pilot and the Little Prince* (2014, pp. 18-19). Metamorphosed landscape.

ICONIC LABYRINTHS, PATHS AND PARADOXES

References to the traditional or archetypal iconography of the labyrinth as a complex geometric representation imbued with symbolic meanings and linked to spiritual and initiatory paths, are frequent in the illustrations of Sís (Figure 1).

A recurring reference is the mandala (Gollapudi, 2010), a spatial metaphor which proposes a centripetal and concentric organization and becomes for Sís one of the many cartographic forms of its repertoire (Meunier, 2015, p. 35. Figure 9).

Moreover, often the author follows a cartographic logic organizing the contents in the space of the double spreads, as if the pages themselves were maps, or mazes. According to Cantavella (2017a), these pages offer the synthesis of several disparate elements and articulate them in the space of a unique representation (Figures 3, 4). "His pages are full of clues and points of reference that we must learn to read in order to understand the whole, for collecting information and oversaturating images with detail and juxtaposition of texts from different sources are features of Sís's style" (Cantavella, 2017a, p. 51). The reader is thus induced to search in the intricate page concrete reference points to know where he is and find the paths to follow. The distribution of the text on the page is also a challenge for the reader. The graphic use of the words in Sís was studied by Latham (2000) who highlighted that the artist places sentences in such a way as to form shapes so that he merges text and pictures to achieve synergy. The scholar stated that "Sís's artistic technique emphasizes the concept of vision as it relates not only to the visionaries depicted within the books, but also to readers/observers who are implicitly encouraged to develop their own ability to 'read' the pictures and 'see' the words" (p. 179).

In Sís's works also appear the most particular forms of labyrinth, those that are at the limits of the very definition of this archetypal structure. For instance, he uses the paths and typically the path puzzles for children, that are de facto unicursal maze that connect two points, an initial and a terminal one connected by a single path (Ugo, 1991, p. 153. Figure 8). Besides, in the family of labyrinths, at the opposite end of the type of the path, there is the desert, where you can go anywhere and nowhere. In *The Pilot and the Little Prince* the Saint-Exupéry's plane crashes in the North Africa desert during a flight to Saigon. In the picture the sense of

bewilderment caused by a landscape without boundaries is accentuated by the lack of light, because the protagonist finds himself immersed the darkness of the night. Also, darkness, as a condition that prevents you from finding points of reference, is undoubtedly a sort of labyrinth.

MAPS TO GET LOST AND FIND YOURSELF

As already mentioned, Sís introduces his young readers into the labyrinths of space, time, history of ideas and explorations. His characters have in common a destiny of freedom and self-affirmation that the context in which they live does not allow them to realize. In all stories the journey is the solution to find the key to the existential, cultural, political or geographical 'labyrinth' in which they are locked. The infinite variety of maps that appear in the texts, certainly also responds to this need to tell the geographical, historical and cultural contexts in which the characters move, but at the same time the maps allow young readers to travel together with the protagonists. Then, as Host (1996) summarized, in their minds "*s'illumine une carte du monde comme un reve d'evasion*" ("a world map like a dream of escape lights up", p. 36).

A lot has been written about cartography in illustrated books for children and in particular in Sís's (Cantavella, 2017a, 2017b, Meunier, 2015, 2017, Pavlik and Bird, 2017). Among the possible ways of representing territories, landscapes, and cities, maps are the most distant from the visual experience and most require abstraction and interpretation skills. Even if they are highly symbolic devices, nevertheless, they frequently appear in children's book, thus introducing young readers to cartographic language and contributing to the development of their spatial reading and prefiguration skills (Meunier, 2016, pp. 35-72). Cantavella (2017a) highlighted the relationship between Sís's discourse on identity and the particular use of maps in his illustrations. The scholar also pointed out how maps are used

Fig. 12 Following page:
Above: Peter Sís, *Starry Messenger* (1996, pp. 20-21). Map of Europe at Galileo's time.
Below: Peter Sís, *Follow the Dream: The Story of Christopher Columbus*. (1991, pp. 18-19). Map of the known world at Columbus's time.


Then one day Galileo heard about a new instrument for seeing things far, far away. He figured out how it worked and made one for himself. Then he turned it to the sky.
News of the telescope reaches Galileo


SAILING
STUDYING
WAITING

as tools for the spatial organization of content and as a way to structure the page. "The maps –she observed– represent a call to adventure and provide spaces for symbolic reading. They are configured as a kind of palimpsest that establishes intertextual relations with elements drawn from collective memory, from history, from the culture of the time being explored, along with the most private mythology of Sís himself" (Cantavella, 2017a, p. 53).

As a matter of fact, far from being objective and neutral descriptions of the physical world, maps reflect historical, political and social aspects, as Sís's maps clearly demonstrate. In his books one witnesses the revival of the symbolic dimension and pictorial and fable-telling language of historical cartography, mainly of medieval and modern maps. Therefore, they testify cartography's diverse historical and cultural expressions, as well as its varied geometric forms. In fact, Sis's maps often show a contamination of various methods of spatial representation. They unite topographical precision and evocative skill, zenithal projections and three-dimensional representations, pictorial depictions and technical drawings, the conciseness of schemes and the descriptive ability of landscape drawing. Cantavella (2017a) underlined that "maps are, for Sís, an important way to organise information in space (non-linearly) and to locate the reader at a midway point between the real and the imaginary" (p. 41). The profusion of maps in his biographical books, which the scholar defines 'odes to space', proves that the exploration of identity is closely connected with that of the spaces in which such identity has constructed itself; from this perspective, Sís carries out a 'spatialisation of identity'.

CONCLUSIONS

Sís's works are not easy to read, they speak the language of art, ancient cartography and ancient books and the importance of the historical dimension of his work is reflected, on

a graphic level, in a multitude of visual references. We could state that this articulated set of references in the texts and in the pictures constitutes in itself a very intricate labyrinth for a young reader. However, by exposing children to this set of cultural and visual stimuli, the author offers them a very rich heritage. Sís accompanies the reader on extraordinary journeys and does so through a surprising repertoire of complex images that draw on the visual culture of the eras to which it refers. In fact, as we have seen, many of Sís's illustrations seem to be imbued with the mentality of the time the story is set in. Therefore, to delve into his stories is like entering a labyrinth that crosses space and time. The author 'navigates' in the history of painting, cartography, naturalistic and landscape drawing, then breaks the visual rules to which we are accustomed, bending them to his story, to the state of mind of the characters, to the emotions that the places arouse in them. This way Sís's books also become a means to introduce young readers to topological structures, projective forms and the codes of cartographic language, a means to develop their spatial and reading and prefiguration skills. Through his personal way of describing space and relating it with time, the author actually connects his young readers with the codified forms of representation, thus enabling them to become familiar with them, and teaches them how to read them. The reader is exposed to complex representations and taken to unknown territories, however, thanks to the particular stylistic style of the author by which you are captivated, they soon become familiar. Sís's graphic language in fact even if imbued with visual references from the past is extremely personal and up with the times.

The artist always provides, somehow, the solution of its labyrinths or more possible solutions. They are not designed to make the reader lose his way or imprison him, but rather to make him travel, to take him off the usual routes. Besides they are designed to accompany inside the personal story of a character, inside his experience and his emotional life, inside his era, to live an engaging

and exciting experience that cannot be fully understood, just as it is not possible to comprehend in a complete, immediate and purely rational way a man's life or the spirit of an era or even a place.

ACKNOWLEDGEMENTS

The works by Peter Sís that are referred to in the present work do not present page numbers. The convention that numbers pages starting from the cover was therefore adopted.

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INTERCONNECTIONS BETWEEN FORM AND MATTER IN TWENTIETH-CENTURY MURANO GLASS

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GLASS
BIOMORPHISM
MORPHOLOGY
DRAWING
DIGITAL HUMANITIES

The digitisation and cataloguing of the *Seguso Vetri d'Arte* archive –together with other archives of glass factories preserved in the *Fondazione Giorgio Cini in Venice*– has led to the analysis not only of the documents themselves, but also of the relationships between them.

What emerges is the particular design process that gives shape to glass. We refer to the process for which the material is responsible, rather than to the intervention of a designer. The role of the designer –in constant cooperation with the glassmaker– remains nonetheless influential, but there are particular constraints to take into account.

The research analyses the process that leads to the creation of an artefact through drawings and, consequently, some features of the production of hand-blown glass artefacts in some of the most famous glass factories in Murano during the 20th century, giving rise to considerations that are related both to artistic and scientific theories emerged in the same years.

INTRODUCTION

The activities related to preservation and research discussed in this article have been developed at the *Centro Studi del Vetro*, which is part of the *Institute of Art History* of the *Fondazione Giorgio Cini* in Venice, and they primarily concern drawings and photographs belonging to the *Seguso Vetri d'Arte* archive. Besides the Seguso production, this archive also includes drawings related to companies such as *Salviati*, *Pauly*, *Zecchin-Martinuzzi*, of which the former *Artistica Soffieria e Vetreria Barovier Seguso & Ferro*, which then became *Seguso Vetri d'Arte*, was the executor (Heiremans, 2014, p. 38). Communication and exchange of ideas were, therefore, of vital importance in the parallel development of shapes and techniques, a process that can be retraced especially in drawings. This will be explained, in the following paragraphs, by comparing drawings made at different stages of creation of an artefact.

The subsequent comparison between different sources (drawings, photographs, catalogues of different glass factories) is also useful to observe the similarities and differences between the initial concepts and the actual products, but also to consider the relationship between a shape and the techniques that have been adopted to obtain it. Thus, the evident interconnection of form and matter will eventually lead us to some considerations about biomorphism, an aspect that becomes important in the artistic and scientific field from the second half of the 20th century, but that glass has always incorporated to some extent, especially considering its chemical structure.

MATERIALS AND METHODS

While the process of digitisation and cataloguing has been performed using advanced technology, such as high-resolution cameras, an advanced scanner and an on-

line platform for the analytic description of documents, the study of the different items has been developed without any computer simulations, so as to focus entirely on the value of the documents themselves. In effect, a model wouldn't have the same impact of these drawings and it wouldn't be so useful for conducting historical and archival research on the way to communicate the 'drawing of glass', meaning 'the drawing created by the material itself', that needs to be understood and brought to life by designers and glassmakers.

Fig. 1 (left) Comparison between different documents representing the spherical vase designed by Vittorio Zecchin for the M.V.M. Cappellin in 1926; (centre) box formerly belonging to the Barovier family and containing pictures, letters an a small Murano guide; (right) two 'master drawings' by Flavio Poli for *Seguso Vetri d'Arte. Centro Studi del Vetro of the Institute of Art History*, *Fondazione Giorgio Cini*, Venice.

This research has been carried out dealing in particular with documents from the *Seguso Vetri d'Arte* archive, composed of about 22.000 drawings, 10.600 photographs and 31 catalogues. Most of the drawings and photographs were already chronologically numbered and they show a combination of lamps, chandeliers and blown glass objects that, in some cases, are imitations of the 19th century ones, whereas in others are consistent with contemporary aesthetics and techniques. Other archives from *Centro Studi del Vetro* have been consulted as well, in particular Aureliano Toso, Fulvio Bianconi, Pauly, Salviati, Cappellin, whose history is somehow intertwined with the *Seguso Vetri d'Arte* (Figure 1).

The digitisation and online cataloguing of these documents aim at complying with standards related to the field of 'digital humanities', in which the application of information technology to art-historical disciplines aims at preserving as far as possible the original documents, while spreading the contents worldwide, often using open-access platforms, according to recent studies and guidelines (Warwick, Terras & Nyhan, 2012). The exploration of the mentioned archives, which are exemplary of the glass production in Murano in the 20th century, is a consequence of this activity.

RESULTS

The archival research conducted to analyse the process that leads to the creation of an artefact allows us to retrace the history of Murano glass in the 20th century, in particular considering the period between 1930s and 1970s. First of all, by taking into consideration the drawings from the *Seguso Vetri d'Arte* archive, we can distinguish the three main phases of the design process (Heiremans, 2014, p. 38):

1. The preparatory sketches, drawn by the designer, were the first step to visualise the shape of the artefact;

2. After that, the designer discussed his concept with the glassmaker in order to understand if it could be created according to the properties of the material and the glassblowing techniques. Thus, the model was purified, drawn at 1:1 scale and often coloured. This was called 'master drawing' and it was chronologically numbered and kept in the factory archive;

3. When an artefact had to be produced, a copy of the related 'master drawing' was made: this 'furnace drawing' was a more schematic representation, with all the notes and specifications necessary for the production. It was a reminder for the glassmaker who created the objects by analogy, even though every artisanal piece remained unique.

Most of the existing drawings belong to this category, whereas sketches were often destroyed and 'master draw-

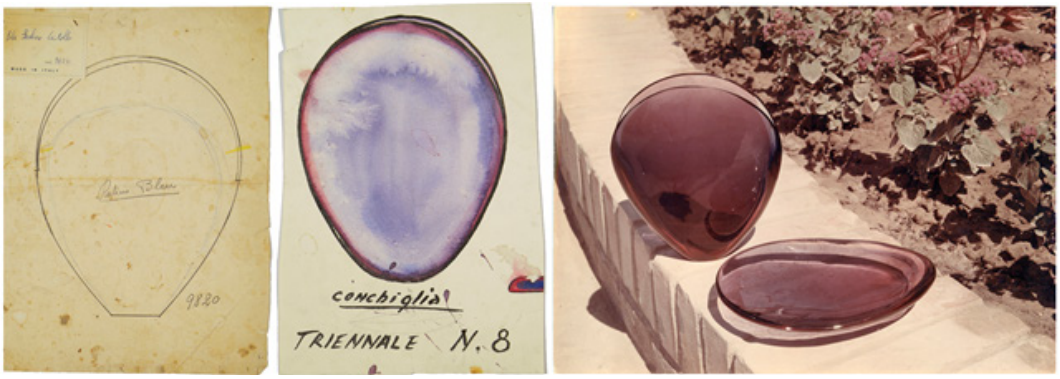

Fig. 2 (left and centre) Two different design phases of the "*sommerso*" glass shell produced by *Seguso Vetri d'Arte* and presented in 1954 at *La Biennale di Venezia* and *La Triennale di Milano*; (right) Photograph that portrays the same object together with a plate made with a similar technique. *Seguso Vetri d'Arte* Archive, *Centro Studi del Vetro* of the *Institute of Art History, Fondazione Giorgio Cini*, Venice.

ings' extracted from the archive. Anyway, drawings of different phases have sometimes been preserved (Figure 2).

This process, considered as a whole, shows the importance of maintaining a constant dialogue between designer and glassmaker, in order to create an artefact that respects the properties of the material. Even in other glass factories drawing was essential in the creation of an object and sometimes, as we can see in a document from the Aureliano Toso archive referred to a vase by Dino Martens, there are more versions of the same drawing, with written specifications and also samples of the different types of glass to be used (Figure 3).

The interconnection between form and matter that we have observed in the drawings can also be found by retracing the his-

Fig. 3 (left) Dino Martens, drawing of the *Ape* amphora for Aureliano Toso, 1952, with glass samples that the master glassmaker needed as a reminder for the techniques to be used, which were difficult to describe in the drawing. Dino Martens/Aureliano Toso Archive, *Centro Studi del Vetro* of the *Institute of Art History* of the *Fondazione Giorgio Cini* in Venice; (right) photo of a vase by Dino Martens similar to the drawing on the left. Retrieved March, 16, 2020 from http://www.artnet.de/künstler/dino-martens/19.

tory of hand-blown glass in Murano especially from the 1930s to the 1970s. This is analysed in relation to the concept of biomorphism, because biological organisms are the best examples of structures for which form is the result of the interaction of forces located inside the matter.

We consider as a starting point the artistic research of the early 1930s, after the well-known complicity between many Liberty works and Ernst Haeckel's naturalistic tables (Haeckel, 1862). In those years, Napoleone Martinuzzi, the artistic director of Venini, who also participated in events such as *La Biennale di Venezia*, stands out for his very rich, classicising production (Barovier, 2013, p. 19), often connected to the natural world (see for example the series of *'Aquariums'*, *'Animals'* or *'Succulents'*). We must mention, in this regard, that animal-like glass sculptures are characteristic of the 20th century Murano glass production (Barovier & Dorigato, 1996, p. 9) and this has given rise to particular techniques to render the volume (Barovier Mentasti et al., 1982, pp. 256-281), for example by adding air bubbles to glass ("*pulegoso*" technique), by modelling thicker layers of material or also by superimposing different layers of coloured glass ("*sommerso*" technique).

A few years later Tomaso Buzzi, who collaborated with Venini specifically in 1932-33, showed in his elegant works, often innovative from a technical point of view, a strong reference to antiquity (Barovier, 2015, p. 29). Compared to the caricatural iconography of Buzzi, Carlo Scarpa's glass works in the 1940s achieved a much deeper figurality (Barovier, 2012, p. 27), thanks to the exploration of biomorphic patterns, in close harmony with Paul Klee's contemporary theory of form and figuration (Klee, 2009).

It is precisely the 1948 *La Biennale di Venezia*, featuring the products of many different glass factories and also a Paul Klee retrospective in a room set up by Carlo Scarpa, that inaugurates the most daring proposals of the 1950s and 1960s: the spatialist research of Vinicio Vianello for *Toso, Ferro, SALIR*, the stained or striped vases by Fulvio Bianconi for *Venini*, the polychrome vases by Dino Martens for *Aureliano Toso*, all examples of more 'abstract' and informal objects, far from Martinuzzi's figurativity.

DISCUSSION

Even in these last cases, biomorphism does not disappear; on the contrary, it can be considered taken up at a deeper level, of a physical-chemical nature, which recalls the ideas developed in the scientific field by Turing (1952), Waddington (1940), Thom (1988), but also the experiments that emerged in the same years in the artistic field (informalism, action painting), or even Simondon's concept of techno-aesthetics (Simondon, 2012). In this sense, the shape of an object is originated from intrinsic forces located inside the matter. Form and matter become therefore inseparable, but this is a characteristic that glass production has always incorporated to a certain extent and that is visible in the design process that we have already analysed. The origin of this particular interaction between forces can be seen in the chemical structure of glass. This material is mainly composed of silicon oxide and it is obtained by solidification of liquid not accompanied by crystallization, which gives rise to an amorphous solid with different states of stress, impurities, nanoparticles, empty spaces in its structure (Figure 4). On a macroscopic level, this affects its workability, flexibility, transparency, optical effects, such as, first of all, colour. Even small variations in these parameters can lead to very different results, as happens in the theory of complex systems underlying the morphogenetic models for living beings.

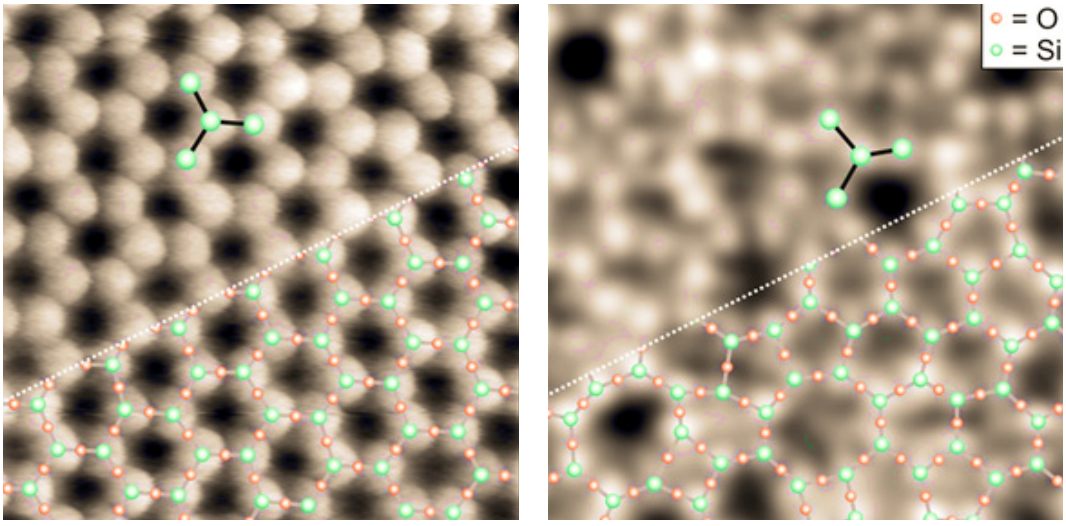

Fig. 4 Comparison between the ordered structure of crystal and the disordered – amorphous– structure of glass. Both are composed of silicon oxide, but the difference lies in the quenching rate: unlike crystal, glass is rapidly quenched after melting, thus it does not have enough time to arrange itself in a regular configuration. Author's editing based on the image retrieved March, 28, 2020 from URL http://romunpress.co.nz/romunnose/.

CONCLUSIONS

The digitisation and cataloguing of the *Seguso Vetri d'Arte* documents, together with the study of other factory archives, allow us to examine the history of Murano glass making in the 20th century from different points of view, between art and science. It would be curious to trace in a more precise way –as far as possible– the relationships between different glass factories, which are still too chaotic to be analysed. It would be interesting to notice how some shapes have not been 'invented' by a particular designer in a particular glass factory, but were already part of a technical knowledge passed on by glassmakers who knew the properties of the material and how to take advantage of them. The role of the designer is still important if we mention the ability of reinterpreting some of those shapes and making them become icons of a brand (like Venini's *Fazzoletto*).

However, we have to remember that, when glass is modelled, there are some precise techniques and limits, for example shape is generated at specific temperatures, with particular techniques and movements, and it conserves the traces of those movements, even though the shape of the final product cannot be deterministically known before its accomplishment. This is the drawing of glass.

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PAPER MODELS OF ARCHITECTURAL SURFACES

IMAGES FOR IMPLICIT AND EXPLICIT GEOMETRIES

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GEOMETRY
PAPER MODELS
ARCHITECTURE
MATHEMATICS
INTERDISCIPLINARY KNOWLEDGE SHARING

This contribution focuses on paper models of architectural surfaces, in particular on some roofing systems describable by developable ones. Drawing on an interdisciplinary approach, between Architecture and Mathematics, potentialities and criticalities of these models in explicitly conveying Geometry are investigated, in relation to educational and communicative tasks, both when they are used in a direct, tangible way, and when the use is mediated by images generated by them (thus indirect); we discuss on the possibility for models and images to communicate their explicit and implicit Geometries.

The main issue discussed is that a material or analytical description unequivocally allows to grasp all the peculiarities of geometrical shapes, while other representations are subject to critical selection of data and are therefore affected by subjective interpretations; similarly, the translation of the physical model into images is the result of choices which emphasize certain object peculiarities over others and is thus less objective. Hence the importance of the physical model (as well as its digital counterparts) which, even if not used directly, can be complementary to a content that, alone, would be partial and/or misleading.

INTRODUCTION

The research described in this paper is part of a wider program aimed at investigating the relationships between Architecture and Mathematics by mean of Geometry, here intended as: a common language, a sum of methodologies and tools to foster architectural and mathematical education at university level, a theoretical but shared declination of Visual Thinking by using physical models of architectural elements. Our contribution is linked to studies on physical and tangible models of developable surfaces. We focus on the multiple communicative values of both images generated by paper models and images generating them; on issues related to the direct and indirect use of models and to their effective communication properties and features also through synthetic representation, namely through a critically selected set of images, in order to construct a visual narration that can highlight their meaning in relation to educational and communicative tasks. Moreover, we propose the use of physical models to foster and enhance the comprehension of architectural shapes, ranging from the study of their geometries to analytic description.

ARCHITECTURE, MATHEMATICS AND PHYSICAL MODELS: CULTURAL AND SCIENTIFIC BACKGROUND

The following paragraphs trace the state of the art for the recognized and consolidated use of physical models in Architecture and Mathematics. Strong historical bases highlight their importance as haptic declination of Visual Thinking, in the sense of Arnheim (1969) and Giaquinto (2011), not only as simple physical scaled reproduction of complex artefacts, but also as specialised instruments to investigate theoretical statements (Elser & Cachola, 2012; Friedman, 2018).

ARCHITECTURE AND PHYSICAL MODELS

In architectural practice the use of physical models draws its origins from the material representations, thus creation of tangible artefacts, used for religious ceremonies, for magic rituals, but also as scaled reductions/reproductions of everyday life scenes. Nonetheless, within these practices many scholars highlighted the celebrative, votive and ludic functions that humans charged models within the ancient times (Smith, 2004, pp. 3-17; Scolari, 2005, pp. 131-132; Barlozzini, 2013, pp. 45-49). One of the very first documented 'technical' interaction between Architecture and physical models can be found either as outcome of the process or example to be reproduced, between *neokóros* and *paràdeigma* (Scolari, 2005, pp. 131-132). Nowadays, at least in the architectural panorama, the general statute of the term model, however, is very complex and not only attributable to the definition of a data to be reproduced or copied (Ugo, 2008, p. 21), nor to a real or digital artefact. The physical model is itself the main result of a complex process of critical analysis: it is the synthesis of the architectural project or of the built space. In this case the model acts as haptic medium, while still presenting itself as an eidetic result of the previously cited processes. In this case, regardless of the specific function of the architectural model, be it votive, celebratory, design one, the model improved its role of simple physical representation, directly explorable by visual means (Bianchini 2007; Ribichini 2007, p. 50) or, on certain occasions, tactile when not immersive *ante litteram* (Docci, 2007, p. 25).

Physical models also played an important role in field which sees the intersection between architectural and structural design (Collins, 1963; Smith, 2004, pp. 89-124; Schilling, 2018, p. 25). Still, it is plenty of examples that highlight the model itself as a true self-contained project of architecture, or final expression of a process of critical/creative mediation between *archè* and *téchne*, in the strict sense (Rizzi, Piscitella & Rossetto, 2014, pp. 31-44). The contemporary debate sees the

virtual model as undisputed protagonist for strengthening the intersection between the developments of "design as a kind of communication" and the strong links between "spatial intuition and image that concretizes it" (Albisinni, 2011, p. 71); while it is also been recognized as a complex meta-system of information (Brusaporci, 2019). Nonetheless, the physical, tangible, haptic architectural model still has a foundational role on several levels. Also, an important issue deals with the use of paper-based physical models, due to their low cost and specific dynamical characteristics, which qualify them to be similar to the family of three-dimensional origami models (Cumino, Pavignano, Spreafico & Zich, 2018a), with special regard to developable surface. There, we have already framed the role of origami inspired models as tangible extension of Visual Thinking both for Architecture and Mathematics (Cumino, Pavignano, Spreafico & Zich, 2018b).

MATHS AND PHYSICAL MODELS

In the history of Mathematics, the appearance of material mathematical models and their production/use, can be traced back to the second half of the nineteenth century, with the flourishing of Descriptive Geometry, up to the first decades of the twentieth century, when the prevalence of a more abstract point of view in mathematical research diminished their interest (Giacardi, 2015; Friedman, 2018).

In the nineteenth century, indeed, many mathematicians from universities and polytechnics across Europe, especially in Germany, devoted themselves to the manufacturing of material models: 'concrete' objects, made of plaster, string, wood, paper or cardboard, representing 3D geometric entities starting from their equations, had interactions both with research (to provide an effective mental image of the abstract objects of investigation) and with teaching at university level, not only in the mathematical field, but also in other disciplines such as Civil Engineering and Architecture.

Felix Klein (1872), one of the promoter of models production, expresses their meaning as a tool "to grasp the spatial figures in their full figurative reality, and (which is the mathematical side) to understand the relations valid for them as evident consequences of the principles of spatial intuition [*Anschauung*]" (Friedman, 2018, p. 123). Also, some models had moveable parts: from an educational point of view, this emphasized visual and haptic aspects of teaching mathematics, which were recognized and taken up again in the last century by Italian scholars about the so-called Intuitive Geometry (Castelnuovo, 1957, p. 91).

In summary, such models were meant to create a further, alternative way to represent mathematical entities. In fact, mathematical thinking is forced by its nature to use representations (Duval, 1999): set of symbols, formulas or visualizations through images external to the mind (such as diagrams, drawings, physical and virtual models, etc.) or visualizations through mental images; and the development of various registers of representation follows progress of Mathematics. As for visual representations, the set of mental processes related to the production and interpretation of images is a fundamental aspect in mathematical activity (Giaquinto, 2011) especially for Geometry.

Since here we focus on paper models of geometrically defined surfaces, we need above all to highlight geometric properties that characterize those surfaces which are representable by them. As it is known, developable surfaces are characterized by the possibility of being unrolled (developed) on a plane without stretching or tearing, namely without changing the measurements of angles and lengths. This is the reason why, in the present investigation, we only deal with developable surfaces. Mathematically this property is expressed by saying that a developable surface can be mapped isometrically on a plane; or, using the concept of curvature, it can be said that developable surfaces are characterized by an intrinsic (or Gaussian) zero curvature. These surfaces belong to the larger class of ruled ones, whose name

(*surfaces réglées*) is due to the French mathematician Jean Nicolas Pierre Hachette (1769-1834) and it means that one can always find at least one way to put a ruler (i.e. a straight line) on them.

A ruled surface is generated by the movement of a straight line in the space: it is enough to assign a director curve, parametrically identified by the point $Q(u)$, where u varies in an interval contained in the real line; so, the surface is represented by an expression of the form $S(u, v) = Q(u) + v\, r(u)$ where for each $u = u_0$, $S(u_0, v) = Q(u_0) + v\, r(u_0)$ describes a line (generator) passing through $Q(u_0)$ and having direction of the vector $r(u_0)$. Developable surfaces are a particular type of ruled surfaces: they were independently studied around the end of the eighteenth century by the mathematicians Leonhard Euler (1707-1783) and Gaspard Monge (1746-1818), using differential calculus and investigating the ways of constructing them.

Monge used thread models of developable surfaces in his lessons at the *École Polytechnique* in Paris. One can prove that a ruled surface is developable if the tangent plane to the surface, at each point of a generator line, is constant and if this property is verified for each generator line. Otherwise the ruled surface is said to be non-developable. Moreover, the generator lines of a developable surface may pass through a fixed point (at infinity or not): this characterizes the cylindrical and conical surfaces respectively; alternatively, the generator lines may be tangent to a given space curve and in such a case the developable surface is called the tangent developable to the space curve.

METHODOLOGICAL APPROACHES TO PAPER MODELS: EXPLICIT VS IMPLICIT GEOMETRIES

In the following paragraphs we will use both the adjectives 'explicit' and 'implicit' with respect to Geometry, but before entering the issues related to such discipline, we remark

that we are referring to such terms with the conventional definition we can find on dictionaries: *Treccani* for Italian original terms, *Oxford* for the corresponding English ones. By using the word 'explicit' we then refer to what is or can be clearly expressed, without any hints of misconception; otherwise with the word 'implicit' we mean a concept that, even without being formally and/or expressly stated, is necessarily involved somewhere else.

PAPER MODELS FROM THE SCHILLING'S *CATALOG*, 1911

It is clear that every physical model (as a designed and accomplished artefact) has an implicit geometry, which allowed its execution and an explicit geometry, perceived at the time of its direct use, whether tangible or visual, or of its indirect use, mediated by the production of images. With regard to the relationships between implicit/explicit and direct/indirect, we refer to a series of paper models described, by means of text and image, within catalogs of mathematical models published mainly in Germany between the late nineteenth and early twentieth centuries. In this context, the physical models of algebraic surfaces produced by the mathematicians Felix Klein and Alexander von Brill were so successful to trigger series production and sales to a specialized broad public (Giacardi, 2003). The sets of models were the subject of a series of punctual publications, subsequently were organized by Martin Schilling in the form of a double-key *Catalog*, one chronological and one thematic, starting from 1903: *Catalog mathematischer Modelle für den höheren mathematischen Unterricht* (Schilling, 1903). The *Catalog* represented, in its various editions, an opportunity for systematizing tangible models with an explicit teaching value (Neuwirth, 2014). Among the many models presented, handcrafted with poor materials (Fischer, 2017), the paper ones offer a variety of shapes obtained through different abstraction modalities, through the choice of characterizing and descriptive elements of the surface in question, and realization processes.

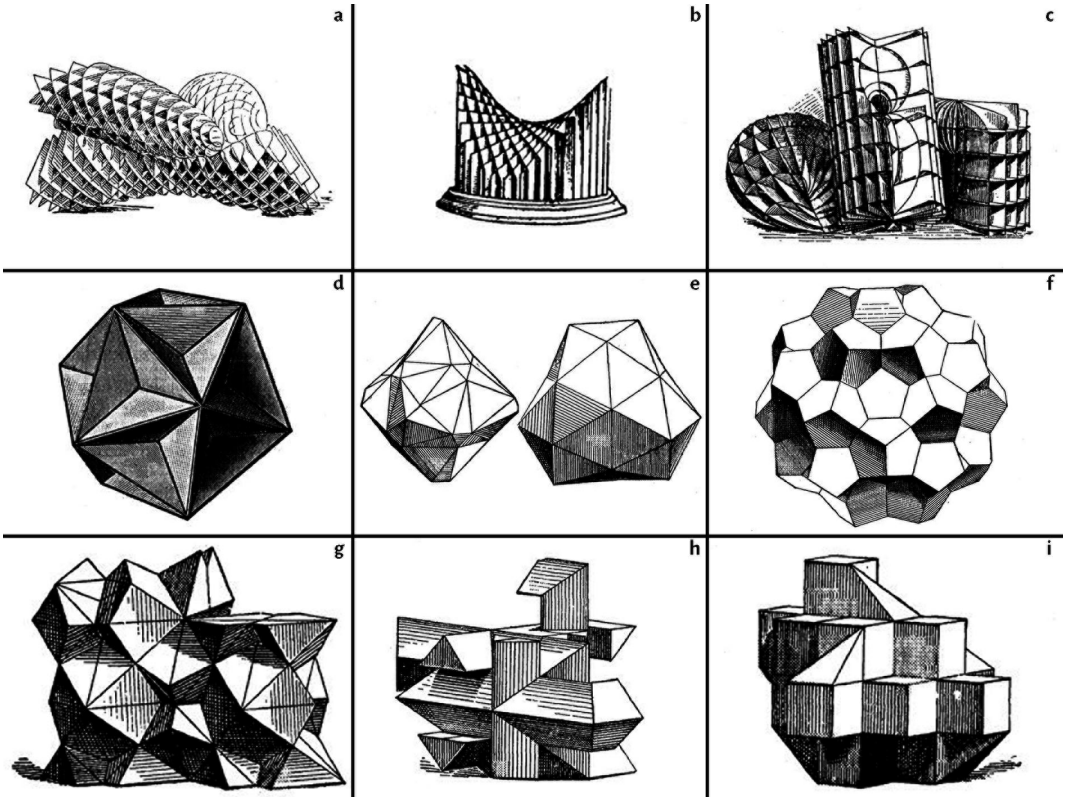


Fig. 1 Models from Schilling (1911): a) Cart.-S., 1, p. 111; b) Cart.-S., 6, p. 114; c) XXII, 1-3, p. 136; d) XXXVII, 3, p. 149; e), f) XV,8-12, p. 156; g), h), i) XIX,1-12, p. 170.

Figure 1 summarizes all the images of paper models in the *Catalog* published by Schilling (1911) (9 out of 99 overall images, two of which in the first part organized by series and 97 in the second thematic part, even though the models described in the *Catalog* are many more then the portrayed 99). Given their eidetic value, the 9 images chosen were considered, on the basis of their communicative values, sufficiently exhaustive to exemplify the relative surfaces. One can recognize models made as a sequence of section planes, where the surface geometry is represented through a completion of meaning (Figures 1a, 1b, 1c); among them one can observe a movable model (Figure 1a) and a fixed one (Figure 1b); a model is faceted by planes (Figure 1d), the other ones are identified by a series of vertices (Figures 1e-1i). Comparing with the photographic images (e.g. Figure 1c with Figure 2) of physical models in the *Tübingen Collection*,

Fig. 2 Cardboard models from the collection of the *Museum der Universität Tübingen*, *Brill's Catalog* (1895): a) XXII,1; b) XXII,2; c) XXII,3 (Seidl et al. 2018, pp. 306, 308).

it can be observed how similar they are to their synthetic and cumulative representation of the *Catalog*: the 'live drawing' description of surfaces is also highlighted by the graphic dressing of shadows underlining the structure depth of planes intersection, so describing by 'absence' their tangent surface.

Overall, one can remark that only a few models are represented in relation to their support plane and that the shadows are not geometrically structured: for example, parts of the plane are dark filled without being shaded by other surfaces (Figure 1f). On the contrary, by comparison with other representations of similar surface models in previous and subsequent catalogues or journals, one can observe that: except Figure 1d, all of them are already present in the Schilling's *Catalog* of 1903; models created by section planes had already been published, partly with different graphic peculiarities (compare Figure 1a and Figure 3a), partly in a similar way (Figures 1c, 3c); all models are confirmed from edition to edition except one (Figure 3b), present in the Walter Dyck's *Catalog* of 1892 as part of a group of four models (Figures 1e, 1f): this is the only one which has no longer been reproduced graphically (the others were distributed punctually in the columns text of specific descriptions).

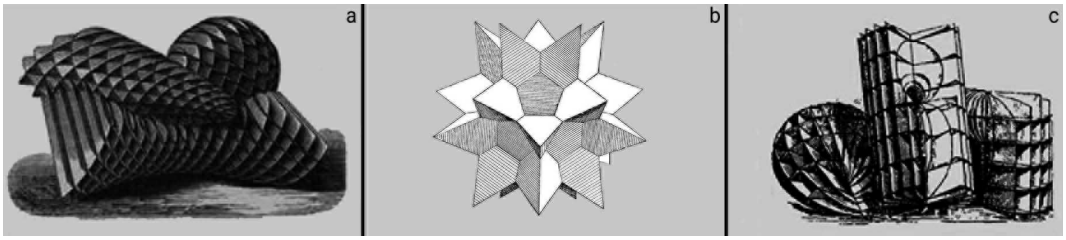


Fig. 3 Pictures of cardboard models from different sources: a) Detail of the publisher L. Brill's Prospectus, 1884 (Seidl et al., 2018, p. 309); b) Model of projection from the fourth dimension (Dyck, 1892, p. 254); c) Detail of an advertisement by L. Brill, 1895 (Seidl et al., 2018, p. 312).

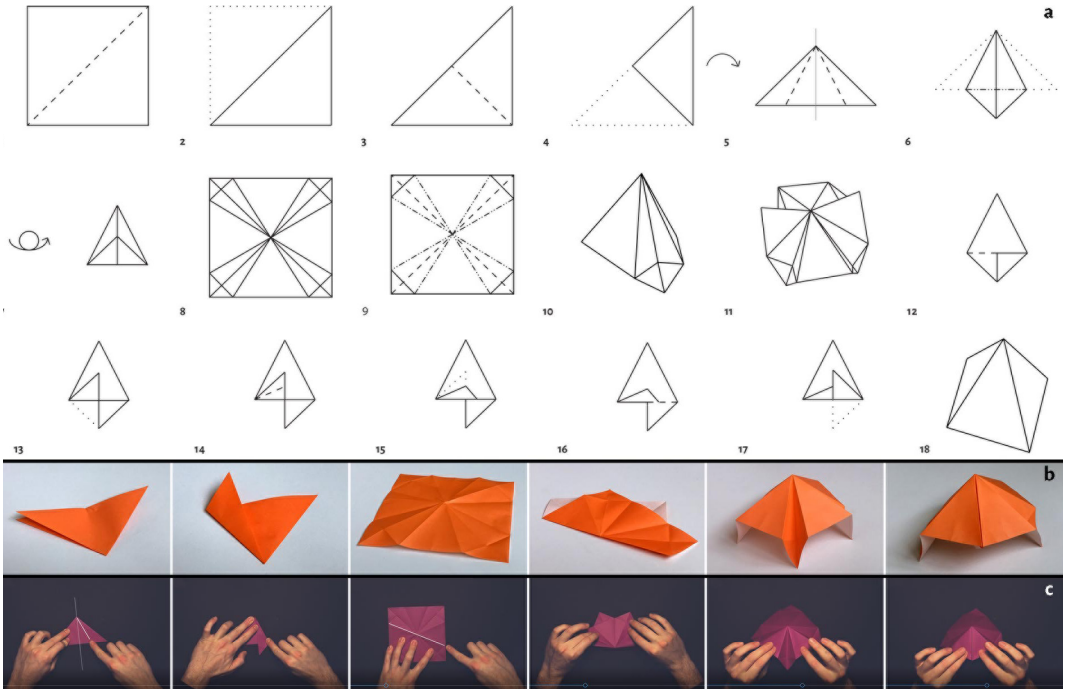


Fig. 4 Square based pyramid: folding sequence through different languages: a) folding sequence; b) photographic shots from a physical folding sequence; c) frames from a folding video tutorial.

ORIGAMI INSPIRED MODELS OF SOME ROOFING SYSTEMS: RESULTS BETWEEN SIGNIFIER AND MEANING

The critical analysis of previously presented models, through their graphic and textual description, offered a basis for an interdisciplinary approach to the systematization of geometric peculiarities for each paper model we are going to propose for the communication of roofing systems geometries. Seeing and perceiving geometries of the built shapes are the result of a mediation between theoretical approach and abstraction skills, in order to recognize concrete geometries. In this sense, our paper models of developable surfaces recognizable in pitched roofs and vaulted ceiling can be considered representative of the architecture in question even if not respecting its material and structure: they are an expression of synthesis in description of the built, without thickness and/or rigor, and they favour accessibility to constituent/latent geometries, not always immediately recognizable in real

dimension of the built, being models for communication and sharing of theoretical surfaces geometric properties. With this intention, paper models simultaneously assume the role of medium for direct exploration and for generation of images that allow various points of view, thus becoming effective communicators, as expressions of Intuitive Geometry. Among the possible paper models, those similar to origami must be considered dynamic geometries even if the final product is static (Lang, 2018): they are transformation of paper sheets, thus the succession of folds shaping them is part of their nature (Friedman, 2018). Each folding step is a geometry implicit in the model, expression of its construction process, a condition without which the final product would not have the designed shape. Meanwhile, the process outcome does not always explicitly show this geometry, where these models as image generators already during the modeling process. Observing roofing systems, one can compare various descriptions of the same folding sequences for a model defined by intersection of planes. Figure 4 summarizes some expressive modalities, essentially graphic without text support, for the transformation of a two-dimensional sheet into a three-dimensional model. Each modality has been tested with a heterogeneous audience and all have proved effective in

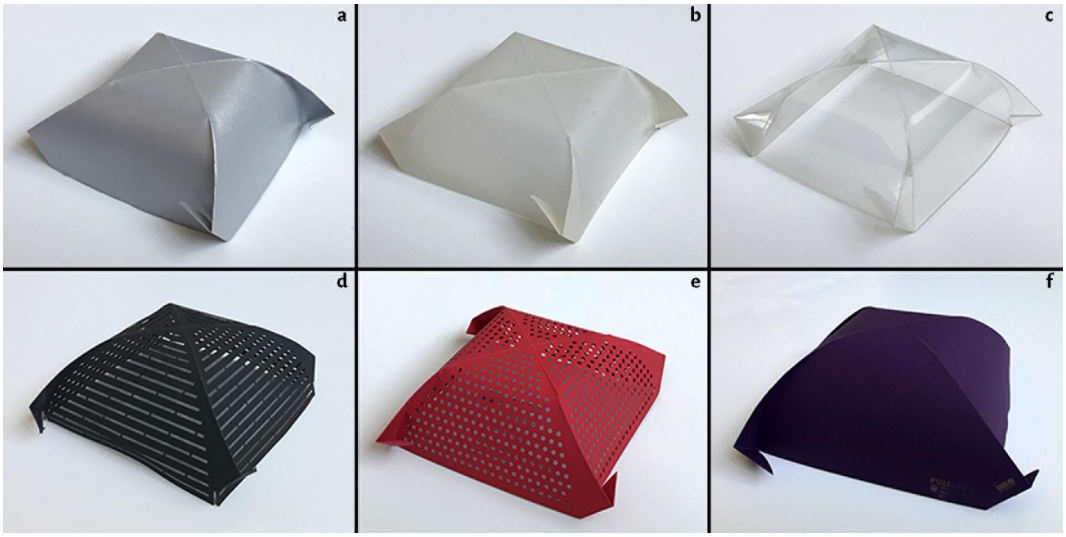


Fig. 5 Cloister vault: origami inspired paper models made by different material with different techniques, highlighting geometric proprieties: a) die cut silver paper 200g; b) die cut tracing paper 90g; c) die cut light acetate; d) laser engraved black paper 220g with holes to let the user see through the model and to show straight lines on the semi-circular ruled surfaces; e) laser engraved red paper 150g with holes to let the user see through the model; f) laser engraved purple paper 220g with partial abrasion of material to optimize the model closure.

guiding the modeling of the pyramid, despite the fact that they have actually intercepted different users' targets, highlighting the medium/user ratio specific to each language (Cumino, Pavignano, Spreafico & Zich, 2017). In Figure 4a, the folding sequence is complete, it uses the origami language both in the type of lines and in the symbology (Lang, 2011, pp. 11-40). In Figure 4b there are only some of the possible photographic shots during the folding phase as well as in Figure 4c some frames are displayed from the illustrative video of the folding sequence: photos and videos have proved to be more shareable tools, as they are less specialized then less pretentious in terms of basic preparation. The fold sequences create a series of images that become an expression of implicit geometries suitable also for indirect use: they illustrate geometric peculiarities that are not necessarily recognizable in the finished model. Nonetheless, images taken from the video sequence partially retain dynamic and physical qualities of 'keeping in memory' the folding steps necessary to achieve the final form (Demaine, Demaine, Hart, Price & Tachi, 2009; Akitaya, Mitani, Kanamori & Fukui, 2015; Lang, 2018). The video sequence, optimized by digital elaborations, is perfectly suited to share and disseminate the geometric dimension of the origami modeling process. In all cases, the origami model can therefore be used both to express and to communicate abstract concepts, provided one checks related terminology, as well as visual results.

A different role is played by Crease Pattern (from now CP): the set of conventionally shared signs that illustrate the folds to be carried out, optimized for production, without showing the sequence. Table 1, lines 1, 6, show the pyramid CP by recognizing the implicit geometry of the model without having the possibility of prefiguring the finished product. By comparing the fold sequence (Figure 4a, step 8) with the CP (Table 1, A1, A6) one can observe the small differences related to the geometries that step by step the sequence carries behind leaving traces on the paper which are not necessary for modeling, thus superfluous in a CP optimization phase. Therefore, starting from a fold sequence, or reopening a model, we always find the CP lines and not only, because many other lines are created in the various passages

producing a summation of folds that are difficult to interpret. Starting from a CP, on the other hand, it is not necessarily possible to reconstruct the folding sequence that defined it, since it is not always the result of a geometric chain and, especially in the management of curved surfaces, it could be a consequence of surfaces development and overlapping that cannot be reconstructed step by step. Hence, CP definition allows the origami design to overcome the limits of folding sequence sharing and repeatability, shifting the problem core on the choice of materials and instrumentation: it can be drawn (directly or indirectly) or reproduced by pressure or engraved by means of a laser ray. It is therefore clear that the way in which its design is traced constrains the choice of materials (Figure 5).

DISCUSSION ABOUT DIRECT AND INDIRECT FRUITION OF THE PAPER MODEL

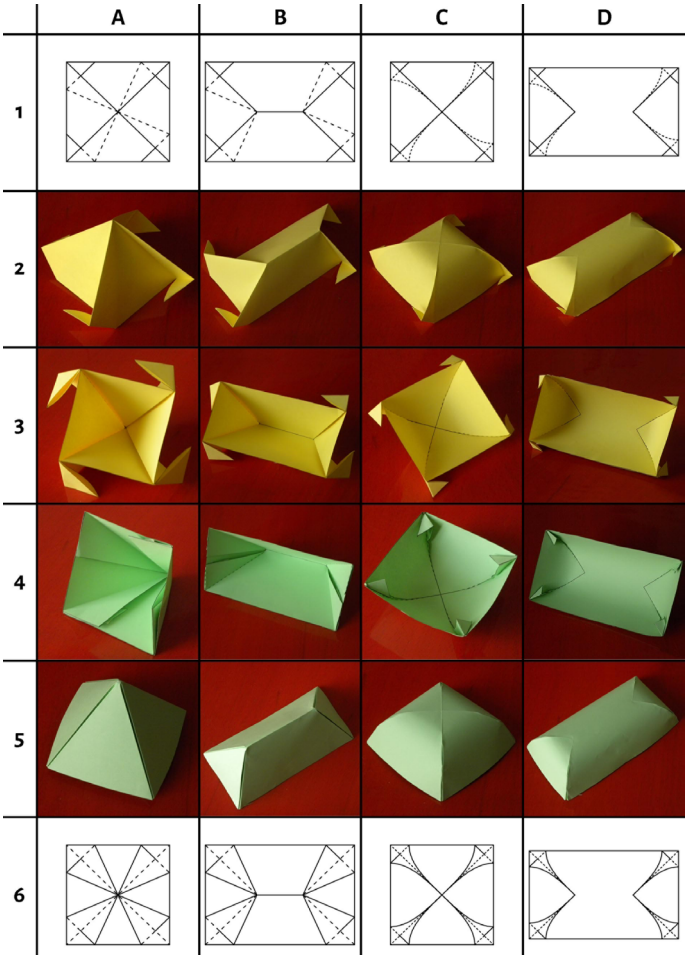
In an education/dissemination context, it is necessary to distinguish between seeing the model and observing its geometric features, between the practice of communicating some geometric ideas through the model and communicating the model and its peculiarities. Models direct use is a shared issue (Megahed, 2017; Hemmerling & De Falco, 2018), considering them as a media for education/dissemination about those architectural artefacts belonging to the large family of Cultural Heritage (Solima, 2012). Their indirect management must be critically evaluated: in absence of the tactile or direct visual exploration relationship, it appears to be a still little explored territory, considering them as models to represent themselves as images to be shared. In this sense, "images [...] bring to light a set of elements and dynamics that engage the observer from a cognitive point of view in multiple ways. Furthermore, the points of view from which we observe them must be manifold" (Luigini, 2017, p. 2). These remarks led us to deduce methods to use of images derived from the models we designed. Firstly, if images have to communicate the model as such, they have to represent the model in its volumetric and

formal complexity, highlighting its material characteristics. Secondly, if images have to communicate particular aspects of the model, they have to show its constitutive geometries. In summary, the increasing complexity of visual communication involves the generation of multipurpose images. Moreover, if the model is the result of an interdisciplinary comparison process, the image derived from it becomes the visual outcome of a design process, graphic as well, for the communication of the different 'model souls' , because each artefact is a set of images disclosed by objects, but also (visual) expression of its iconic meaning through images (Gay, 2015, pp. 169-171). As a consequence of our present outcomes, we propose a small integration in the statute of the term model, giving it the role of image generator, according that the origami/paper model is the result of a design process, synthesis between Representation and Geometry.

DIRECT FRUITION BETWEEN VISUAL AND HAPTIC EXPLORATION

In modeling vaulted surfaces, the description of extrados and intrados does not necessarily coincide with the concept of *recto* and *verso*, since it should be functional to explain either one or the other surface without the presence of the extra-paper, for the communicative purposes of the model. Therefore, it is possible to design different solutions to describe and fold the same architecture (Cumino, Pavignano, Spreafico & Zich, 2018a, p. 87)

Table 1, lines 1, 6 show that the same shape has different representations/CP according to the management of the extra-paper. With extra-paper outside is indifferent to deal with cylinders having as a cross section a broken straight line or a curved one; for extra-paper inside in the first case it is possible to bring it closer to the translation surface minimizing its perceptual impact, while in the second one this is not possible and therefore the extra-paper inside disturbs the reading of intersection curves without allowing an optimal reading even from the outside, because segmentation points of the



Tab. 1 CP and origami models of covering surfaces: A) Pyramid; B) Pitch roof; C) Cloister vault; D) Barrel vault with cloister heads; 1) CP with extra-paper outside; 2) models extrados with extra-paper outside; 3) models intrados with extra-paper outside; 4) models intrados with extra-paper inside; 5) models extrados with extra-paper inside; 6) CP with extra-paper inside. 1C is the result of a research described in Cumino et. al (2015).

intersection curve arise in correspondence to inside paper stratifications. The outside extra-paper solution respects the geometric rigor of the project, while the inside one is rigorous only for planar surfaces. This model, as a support to the visit in person of the described spaces, privileges the description of accessible areas to create a direct, visible and tangible connection with the artefact and subsequently allows integration of other information not directly visible in the built (Armand, Cumino, Pavignano, Spreafico & Zich, 2018).

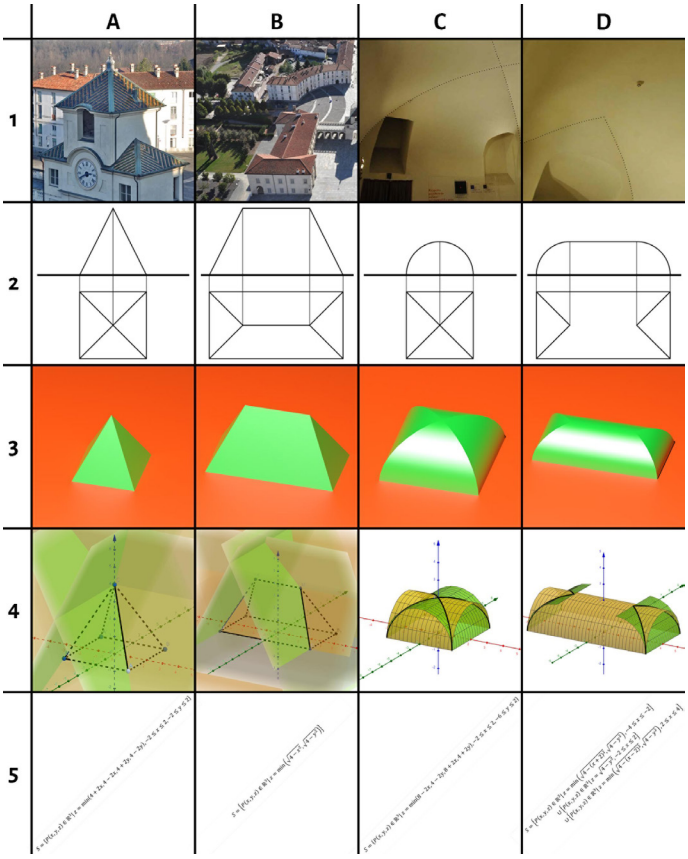
In this case, the model must have finishes that do not interfere with geometric perception of the visible.

INDIRECT FRUITION BETWEEN DESIGN AND COMMUNICATION

Problems related to direct exploration of a paper model lead to evaluate its design in close relation with its communicative intention. Table 2 shows relationships between real object (row 1), theoretical surface recognized as the description of the built, representation on projection planes (row 2), 3D modeling (row 3), *GeoGebra* modeling (row 4) and analytical description (row 5). The critical observation of the built object is exemplified by facing four different problems. Roofs in columns A, B are not entirely perceptible in a direct way: their vision is limited by the height of the point of view; these surfaces are defined by intersections of cylinders with a broken straight line as cross section, highlighted by the arrangement or by the choice of materials. On the other hand, vaults in columns C, D, are intersections of cylinders with a curvilinear cross section and the corresponding surfaces are represented precisely from the user's point of view; here intersections are not highlighted by structural or decorative elements. The proposed surfaces are those closest to the real situation: it is rare to observe a pitched roof from its intrados and the consistencies of a vaulted surface from its extrados (usually this one is covered and inaccessible or even embedded in, for example, the upstairs floor), thus overcoming any limits related to the actual accessibility of the point of view.

Similarly, the use of orthographic projections, with projection centre at infinity and therefore far from perception of reality, has the same purpose of representing such surfaces in the most objective and synthetic way, to describe their geometry. The limit of this representation is its 'specialization' governed by a very precise and unintuitive coded language.

Rows 2, 3 allow a comparison of representations on projection planes and 3D modeling, through the choice of a similar point of view (from the outside). The result is an immediacy of the three-dimensional speech with respect to that of the projection planes and the non-exhaustiveness of both presentations, with the added value of the interaction



Tab. 2 Representation of covering surfaces: A) Pyramid; B) Pitch roof; C) Cloister vault; D) Barrel vault with cloister heads; 1) Real objects pictures; 2) Orthographic projections of their theoretical surfaces; 3) CAAD 3D modelling of theoretical surfaces; 4) *GeoGebra* 3D modelling of theoretical surfaces; 5) analytic descriptions.

between them. Comparing the communicative potential of these representations, also origami in Table 1, we can underline how different the comparison with the haptic model is, rather than doing it with the images derived from it. As for rows 3 and 4, one should remember that, unlike other fields of knowledge, there exists no other ways of gaining access to the mathematical objects but to produce some semiotic representations of them; moreover, a mathematical processing always involves substituting some semiotic representation for another, namely the representation of an object is 'translated' into a different representation of the same object (Duval, 1999). The set of equations and inequations in row 4 analytically describes a locus of points in the space, while row 3 shows the corresponding visual translation easier to grasp for everybody, obtained by

a 3D *Geogebra Calculator*. In a certain sense this path refers to the editorial choices of the aforementioned Schilling's *Catalog* (1911), where only two registers were used to present mathematical models: natural language and images, not equations. Moreover, *GeoGebra* models proposed here can be interpreted as image generators providing information on the geometric genesis of the study objects, complementing that of corresponding paper models; just consider, for example, the case of cloister heads vault in column D, where the *GeoGebra* model highlights the cylinders whose intersection generates the surface. However, the fruition of the 3D *GeoGebra* dynamic model, instead of a set of its static images, would be much more easy-to-understand and 'explorable' in a direct way, although not replaceable to the physical model, for the visual analysis of its implicit geometry. Graphic representations as above, i.e. static images generated by *GeoGebra*, raise some communication issues: Tab. 2 A3, B3 show that the geometric genesis of both the pyramid and the pitch roof requires quite a high abstraction capability, to be understood. The user has to recognize the shape faces following the continuous/dashed segments which mark the intersections of planes containing them; similarly, in C3, D3. *GeoGebra* does not provide a simple representation, as it does not remove that portions of cylinders not belonging to the described shape. Nonetheless, referring to Table 2, D3 one can see that the geometric generation of the architectural shape is more comprehensible than the C3 one, even if the *GeoGebra* represents the both in the same way.

EXPLICIT/IMPLICIT, DIRECT/INDIRECT

Consider for example the pyramid model (column A in Table 1 and Table 2); one can see that the geometry shown by the origami model is evidently linked to the defining plane surfaces; however, the relationship full/empty is unresolved (compare Table A2): the origami model, due to its design, has no basis and it is not explicit whether it is empty or not; moreover, the absence of a basis is explicit in its direct use while it is not equally explicit in the indirect one thought images. The non-exhaustiveness of geometric description produces a misunderstanding also in other representations; this highlights the effec-

tiveness of direct exploration of tactile models to complement the description of a surface. An implicit geometry is added to the explicit geometry, unequivocally communicated by the model direct use, belonging to the model design path; this latter, in an origami model, can be enjoyed directly by reading the CP, or indirectly through its images. Direct fruition manipulating the CP further completes the communication by enriching the message with dynamism of transformation, at the same time expressing implicit geometry of final model and explicit one of the geometry of single fold. In the pyramid origami model we can therefore recognize as implicit geometry not only the one underlying the design process but also the one in the production process. This applies to each of the models presented here.

CONCLUSIONS

In this contribution we have drawn on the analysis of mathematical paper models and on design experiences of paper models of some roofing surfaces describable by developable ones; working with an interdisciplinary approach, between Architecture and Mathematics, we investigated some potentialities and criticalities of these models in explicitly conveying Geometry, both when they are used in a direct, tangible way, and when the use is indirect, mediated by images. As each language has its specificity, each image is a form of representation and "the main difficulties can be found in the transliteration of concepts and arguments from one discipline to another when they take on different meanings depending on the context –the term 'representation' alone is a clear example" (Luigini, 2019, p. 180).

In general, Geometry that can be communicated varies in relation to the type of use/users: when using physical models in deferred/indirect mode, or rather through interposed medium, it is important to pay attention to criticalities of their representation with respect to relationships between signifier and meaning.

It is a fact that a material description and an analytical one are unambiguous and allow unequivocally to grasp all the peculiarities of geometrical shapes, while other representations

are subject to critical selection of data and are therefore affected by subjective interpretations. Similarly, the translation of the physical model into images is the result of choices emphasizing certain object peculiarities over others and is thus less objective. The relationship between message and receiver is indeed conditioned by context, background, language, experience and not only. A significant example is provided by Schilling's *Catalog* where textual description of geometrical surfaces supported by few symbolic images with even less analytical descriptions was considered sufficient for mathematicians (and indeed it was) to understand surfaces geometry in a unique way. Nowadays: more or less sophisticated computer-graphics programs allow to represent geometric objects starting from their analytical description, obtaining virtual models that can be observed/manipulated in a virtual space, to better understand their geometric properties, thus enriching the visual and intuitive component in the study of Geometry.

The importance of the physical model arises both from its physicality and from the transmission potential of the geometries related to it (Gay, 2000), since, even if not used directly, it can be complementary to a content that, alone, would be partial and/or misleading. Last but not least, physical models (as well as their digital counterparts) are both generated by and possible generators of a consistent and articulated set of images.

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Although the contribution was conceived jointly, paragraphs were authored in this way: Introduction; Architecture, Mathematics and physical models: cultural and scientific background; Origami inspired models of some roofing systems: results between signifier and meaning; Discussion about direct and indirect fruition of the paper model; Direct fruition between visual and haptic exploration; Indirect fruition between design and communication; Explicit/Implicit, Direct/Indirect, Conclusions by C. Cumino, M. Pavignano and U. Zich; Architec-

ture and Physical models, M. Pavignano; Maths and physical models C. Cumino; Methodological approaches to paper models: explicit vs implicit geometries; Paper models from the Schilling's *Catalog*, 1911, U. Zich.
Figures credits: Fig. 1 Schilling, (1911). Fig. 2 Museum der Universität Tübingen. Fig. 3a, 3c Museum der Universität Tübingen; 3b Dyck (1892). Fig. 4a Instructions were elaborated in 2016 by V. Bosetto during her trainee at Polito DISMA with the Centro Studi Residenze Reali Sabaude in Venaria Reale, Italy; Fig. 4b Authors; Fig. 4c frames were extracted from a video made in 2018 by P. Farina during his trainee at Polito DISMA with the Centro Studi Residenze Reali Sabaude in Venaria Reale, Italy. Fig. 5 Authors.
Tables credits: Tab. 1 Authors; pictures by A. Manino. Tab. 2 Authors; A1, C1, D1 U. Comollo; B1 Google Maps. We warmly thank the Centro Studi Residenze Reali Sabaude for granting us the permission to use pictures of the Royal Residence of Venaria Reale; Giovanni Berruto (Polito – DAD, ModLabArch) for his technical support in prototyping and producing our models; Ornella Bucolo and Daniela Miron (Polito – DAD, LabRilDoc) for their technical support in photographing our models.
Crease Patterns credits: Authors.
All our models were folded by C. Cumino.
All graphic elaborations were made by M. Pavignano.

DECLARATION OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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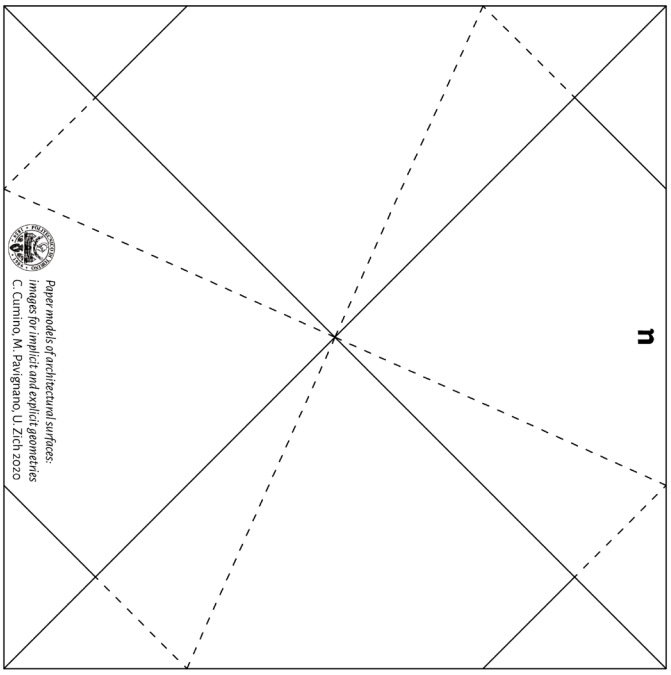
SUPPLEMENTARY MATERIALS

We attach the CPs of the paper models described in the paper, in order to provide the possibility for the reader to fold them and analyse our exposition with the haptic support of these tangible artefacts. The first four CPs refer to models with extra-paper outside (Table 1, A1-3, B1-3, C1-3, D1-3), the last four CPs to models with extra-paper inside (Table 1, A4-6, B4-6, C4-6, D4-6). The CPs follows the standard origami language: straight line = mountain fold, dashed line = valley fold. CPs can be printed. The 'modular unit' is the base side of pyramid and cloister vault (smaller sides for pitch roof and barrel vault with cloister heads).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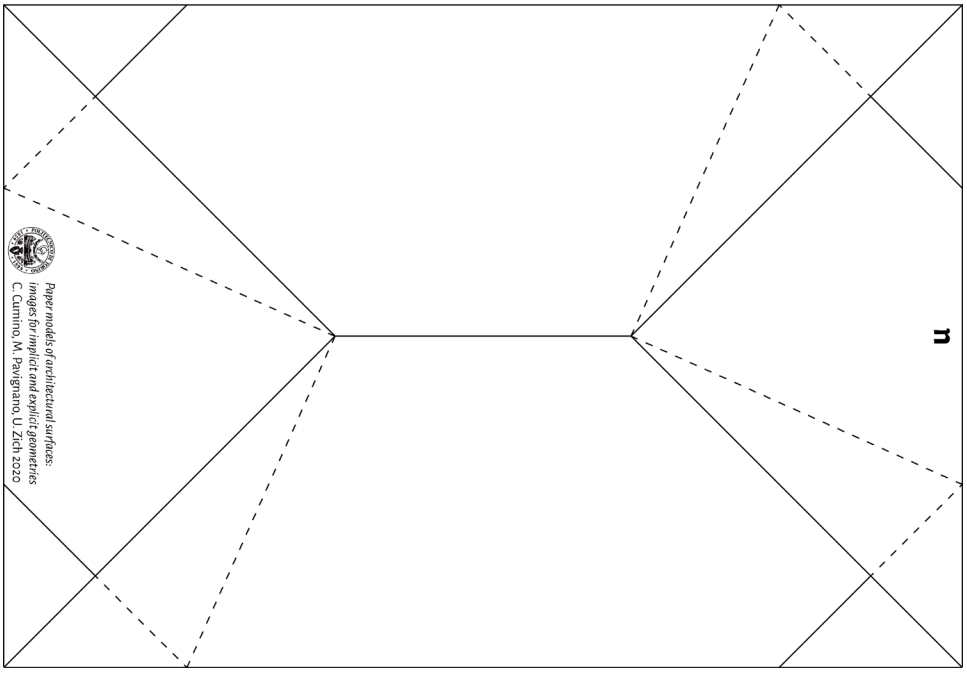
Paper models of architectural surfaces:
Images for implicit and explicit geometries
C. Cumino, M. Pavignano, U. Zich 2020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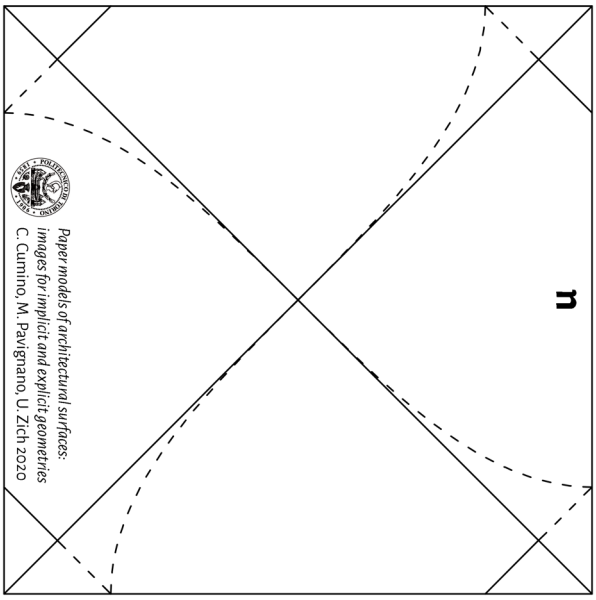
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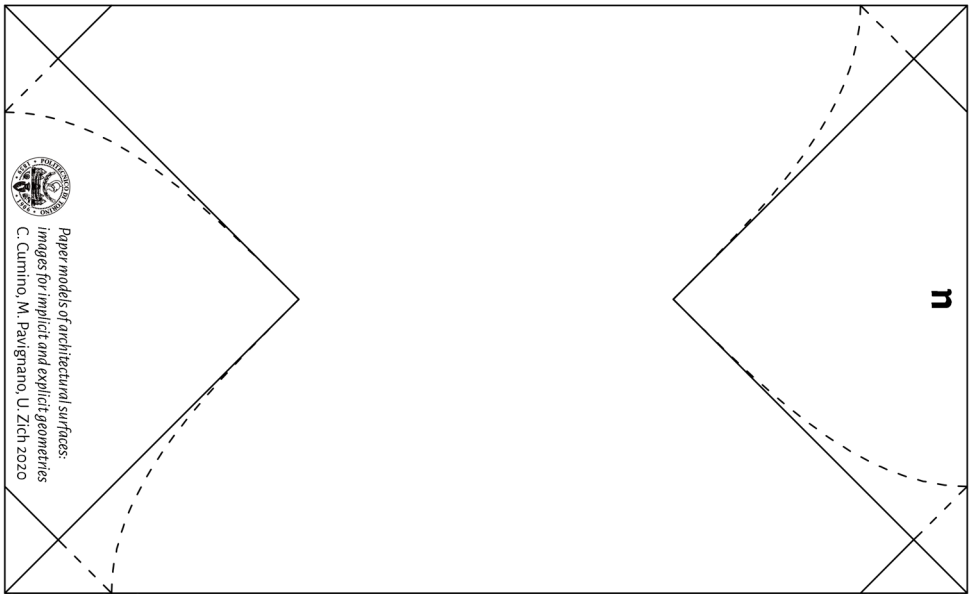
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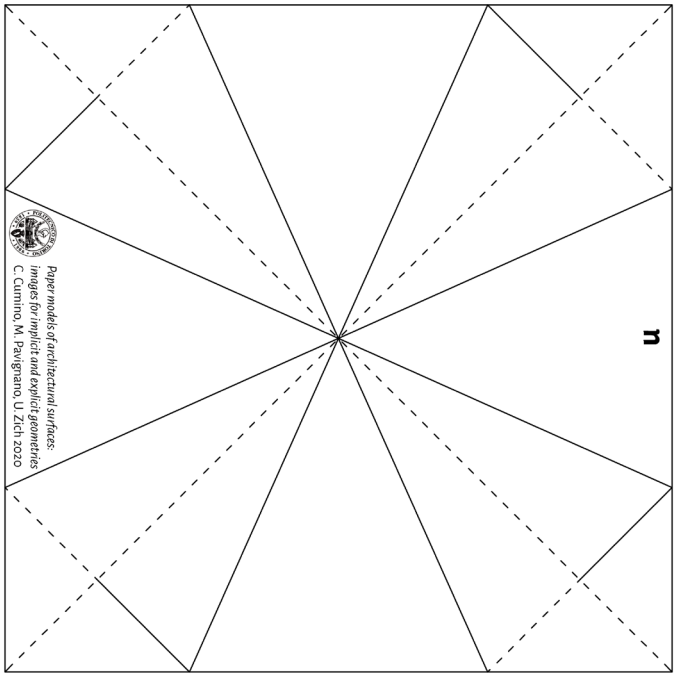
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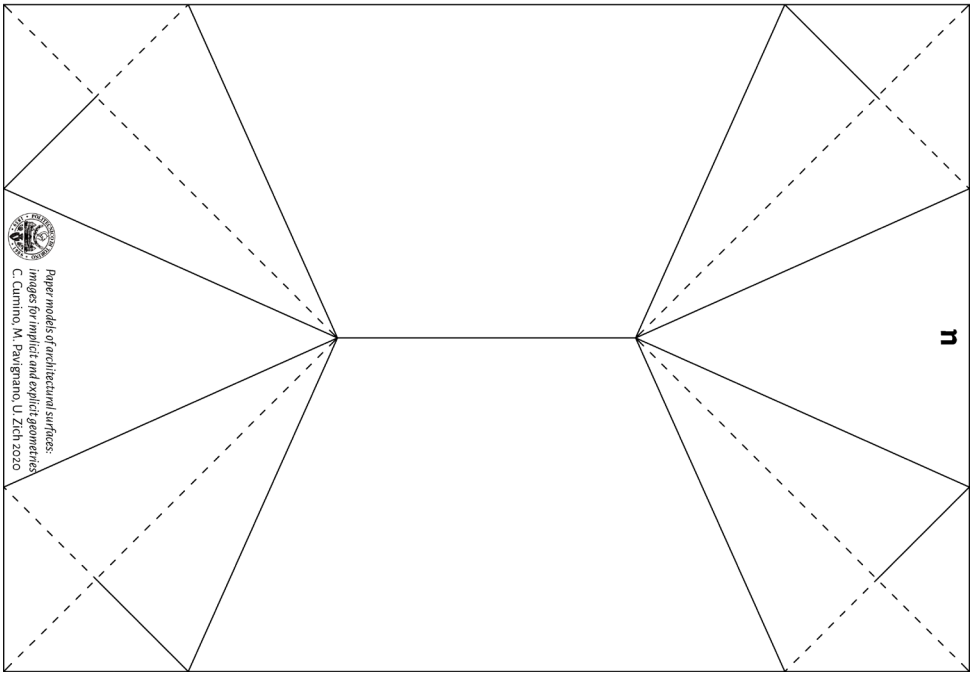
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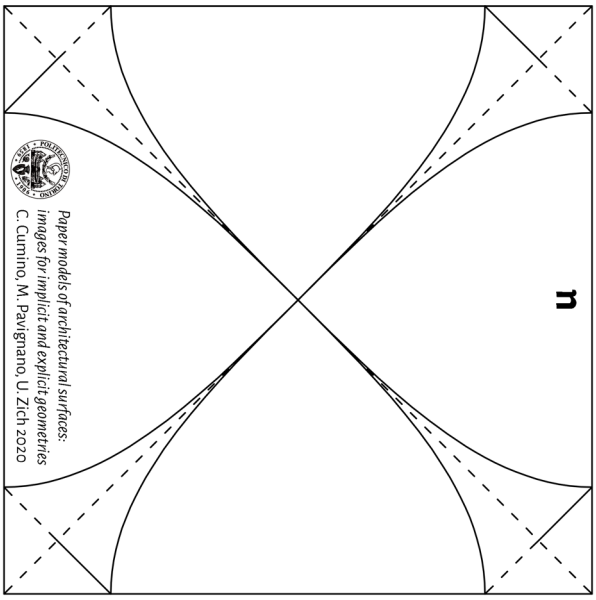
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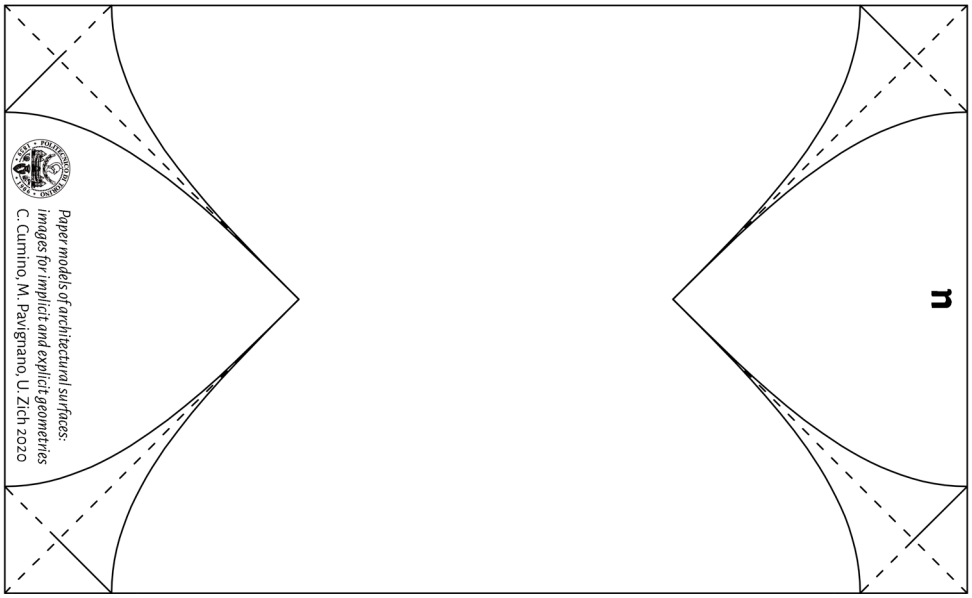
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ABOUT SOUND MARK
CONSIDERATIONS OF IDENTITY CONNOTATIONS

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ESSAY 33/02

VISUAL LANGUAGE
GRAPHICS
CONNOTATIVE SIGN

The issue of visual identity is central to advertising projects and operationally starts from the design of an identifying brand even if with different aspects and ways of application, depending on the historical period and to the geographical and socio-cultural context. This diversification is well pointed out by the studies in place, that increasingly propose forms of flexible and mutant branding, according to logics very different from those applied in the past, derived from the rigid and static application of the sign in every form of communication instrument –from typographic material, to packaging, to online contributions and so on.

Here is to emphasize a particular type of brand, that is the sound one, which belongs to the world of visual communication in motion and that, through the commercial spots, has entered everyday life, to check its possible interrelationship with two-dimensional visual graphical communication.

INTRODUCTION

The work here presented is the continuation and deepening of what has already been discussed at *IMG 2019, From the sound to the sign. Graphic experiments for the visual transcription of the sound aesthetic experience* (Bistagnino & Falcidieno, 2020), which in the first part posed precisely some method questions about the possibility of establishing a parallel among verbal language, graphic language and sound language.

A few basic concepts are therefore considered as acquired (Bistagnino & Falcidieno, 2020), while we will now talk about a further parallelism, which sees a comparison between the primary design instrument of the identity visual communication –that is, the brand– and the counterpart made with sound.

Only a short, necessary premise, which wants to remind how the research in question has had multiple experiments over time and has been systematized and coordinated at the theoretical-methodological level in the volume *Sound emotion. Cinema & Advertising* (Castellano & Falcidieno, 2012).

MATERIALS AND METHODS

One of the main concepts from which the here focused considerations on sound begin, is precisely the one that focuses on the qualities that a word or image, intended as signals and elements of the message –either written or represented– must have to be 'winning' that is, fully responsive to the purpose that they propose and which must also be re-proposed for sound communications. A signal –to be 'winning' and to respond completely to the proposed aim, taking into account what has been said in multiple locations– must be responsive to at least three parameters:

- lack of ambiguity;
- ease of storage;
- expressive simplicity.

And, besides these specifications, it is also necessary to refer to the main differentiation made in introducing reasoning on

sound as communication: communicating sound and communicating 'with' sound.

Communicating sound means being able to transmit it in a non-sound way, through images, words or tactile elements, which replace the sense of hearing with other senses; it is enough to think of the language of music on the scores or the onomatopoeias of comic narratives or the experimentation of music for the deaf to understand the meaning of a 'replacement' form to convey sound, be it coded and recognizable or entrusted to the sensitivity of the individual.

Another thing is to communicate 'with' sound, as in this case there is a question of using sound –noise or music– as an added value to the dynamic graphic project, as it often happens with the structuring of videos, commercials or other audiovisual expressions; thus, a value, also symbolic, is configured for sound manifestations, according on the solicitations that such forms of communication provoke in the observer.

For what is in the field of interest of this study –that is advertising–, one of the products, most affected by sound or noise as a memorizable solicitation linked to what is visually shown and consequently with a brand function, is undoubtedly the 'commercial spot', which in a very short time must suggest and illustrate a concept, so as to move behaviors that can induce the appreciability of an outcome, no matter whether of commercial purchase, political support or ethical-social change.

It is also quite clear that the sound annotation can play one role rather than another within the visual narrative: it is essentially a matter of helping to emphasize and increase the emotional perception of the user in front of the story or to play a role that is quite similar to that of a sign connoting the identity of the promoter of the message itself, in this case not a visual, but an auditory one.

This second aspect proposes the possibility of designing a type of brand, which, although belonging to a sensory world not usual for graphics, proposes and uses the same compositional mechanisms.

The fundamental characteristics of a brand are the originality, the flexibility in the declination at different dimensional and color scales, the construction grid, which allows its reproducibility; a mark defines identity, a sound can connotate it just as effectively, as some examples indicate, which can help in understanding the similarities between the visual graphic elaborate, connotative of identity, and the sound: an hymn connecting to a precise country or ritual music, such as wedding marches, funerals –or even the chimes of the bells– which follow precise rhythms connected to the liturgy of feasts, sorrows or more simply to hours.

From the above considerations it is useful to establish some similarities among static and dynamic graphical contexts, which according to the previously given theoretical premises found their reasons in being both languages and, therefore, real 'texts' translated into images and sounds: according to this logic, speech, music, noise are completely akin to writing, in its many and possible meanings, whether they are narration, simple quotations, onomatopoeia or single words.

The advertising communication products, where sound sources can be found, are advertisements, in which a story is set with texts and music, noises, and which –depending on the amplitude and duration– can be compared to elaborate texts ranging from a story to an epigram, by virtue of their time duration; the design effectiveness, therefore, depends on the appropriateness of the choices and on the compositional structure that uses the sound components –music or noise– and textual/visual.

RESULTS, DISCUSSION

The sound contribution will thus fit into the chain of identity variations. The optimal areas of intervention to use sound or noise as a sign of brand identity are –as mentioned above– those related to advertising in the non-printed versions: movies, videos, websites, spots where the sound mark is repeated also in different variations, but coordinated, in a

way that is quite similar to what happens for the traditional graphics apparatus.

In fact, it is always necessary to adjust the communication project depending on the medium used, which is not only obtained with a dimensional change –spatial or temporal, depending on whether it is a graphic or a sound mark– but where, on the contrary, it is introduced a real compositional reformulation and relationships between the parts: in the visual identity of the sound, therefore, it ranges from complete songs to individual parts easily memorized –choruses for example– up to contractions consisting even in a single, fundamental and meaningful sound.

Brevity is always difficult to achieve in an exhaustive way and in this sense it is necessary to reason when talking about a few seconds spots and the sound mark combined with them; in such a limited time space, a story is told, brought to a conclusion with the exaltation of the message to be transmitted, in order to hit the user and make the purpose of communication easily recognizable.

Fig. 1 Onomatopoeia, *Brancamenta* spot ("*BRRR... BRANCAMENTA!*"). Retrieved April 29, 2020 from https://www.youtube.com/watch?v=ENS4SCDTZTY

Fig. 2 Jingle, *Clementoni* spot ("*CLEM CLEM*"). Retrieved April 29, 2020 from https://www.youtube.com/watch?v=5X6qNbVfDpE

Equally necessary is to configure a correct design in reference to the specific functions that the sound must comply with, within the visual composition, just as it does for graphics; generally speaking, by summarizing and drawing conclusions derived mainly from radio communications as more related to the value of sound alone, five main roles can be identified (Julien, 2003):

- demarctive;
- implicit;
- decorative;
- affective;
- ethical.

Finally, it is also possible to propose a list of the main forms of sound brand applied to commercials taken from the volume *Sound emotion. Cinema & Advertising* (Castellano & Falcidieno, 2012, pp. 109-111):

Fig. 3 Composed sound for the company, *Plasmon* spot. Retrieved April 29, 2020 from https://www.youtube.com/watch?v=pDNCgFEt9S0

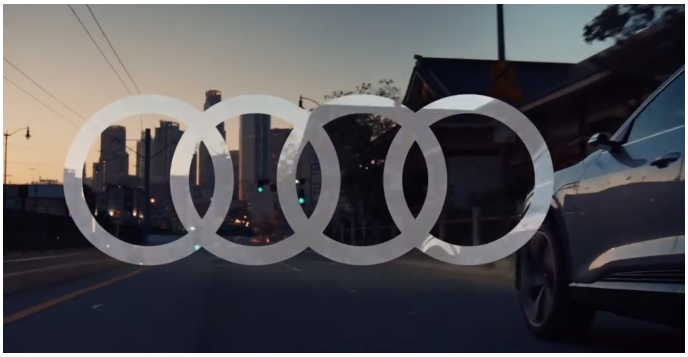

Fig. 4 Music, *Audi* spot. Retrieved April 29, 2020 from https://www.youtube.com/watch?v=WvEAklsAAts

- Onomatopoeias

"*Esempio chiarissimo, in questo ambito, strettamente connesso al mondo della comunicazione linguistica e grafica, è rappresentato dalla pubblicità per il liquore* Brancamenta*: in questo caso, infatti, l'onomatopea è la parola* Brrrr*, parte iniziale del nome del prodotto, che viene letta e scritta per suggerire l'idea stessa del freddo. La bevanda, infatti, a base di menta, ha come caratteristica proprio quella di essere rinfrescante e questo è il messaggio da veicolare al pubblico*" (p. 109).

- Music and Jingle

"*A tale proposito, può essere elemento chiarificatore* [...] *separare la musica vera e propria dal jingle, che nel suo primo significato identifica il tintinnio, lo squillo, ma nel secondo significato, invece, rimanda a una rima senza significato; tormentone, dunque,* [...] *segno fortemente legato alla sfera dell'intuizione, del sentimento, dell'approccio percettivo. Esempi chiarificatori possono essere le prime campagne video della* Barilla *e quelle della* Coca Cola*, per l'identità collegata ad un brano musicale composto appositamente per l'azienda* [...]*; le campagne video per il limoncello* Limoncè *o per le zuppe surgelate* That's Amore *per l'utilizzo di brani musicali famosi* [...]*; gli spot di* CheBanca *e* CRAI *per la rivisitazione di brani famosi; le pubblicità della* Bauli *per il jingle*" (p. 110).

- Sound of objects

"*Tra i suoni di oggetti in senso stretto, si possono considerare gli strumenti musicali, le suppellettili e gli accessori da cucina, spazzolini da denti e articoli sportivi e così via, mentre per i rumori legati al prodotto il rimando principale è al cibo –gelati ricoperti come il* Magnum *della* Algida*, patatine e merendine– o alle bevande, fino al rumore mimato del gas dell'acqua frizzante* Brio Blu" (p. 111).

Another element to be considered as for the critical reading of the sound mark is its position within the spot, which can be in the opening, along the narrative or in closing, always and in any case placed in such a way as to be made unique and recognizable; this means global compositional choices, which take into account all the components –textual, image, can be seen from the history of the manifesto and advertising in general, as well as from the history of visual art.

Fig. 5 Sound of objects, *Magnum* spot. Retrieved April 29, 2020 from https://www.youtube.com/watch?v=bTmegHcGdm8

Fig. 6 Sound of objects, *Mentadent* spot. Retrieved April 29, 2020 from http://polisemantica.blogspot.com/2013/01/mentadent-il-sorriso-di-biancaneve.html

Fig. 7 Sound of objects, *Pringles* spot. Retrieved April 29, 2020 from https://vimeo.com/258093437

CONCLUSIONS

In conclusion, to effectively understand the relationship among sound brands and visual brands, a reference may be the companies that start from the formulation of an extended brand, linked to the name of the promoter, and then move on to a synthesis and to the extremization of an essential and chromatic reduction, or directly intervene by linking the product to a synthetic sign that represents and identifies it; often even for the connotative sound elements of identity it is no longer necessary to carry out the narration to have confirmation of the promoter: the sound element is sufficient.

These considerations, therefore, want to emphasize the belonging of the sound element as a further possible component of graphic communication, in particular of the visual identity; it is a valid alternative or addition to the traditional brand in terms of dynamic achievements, especially advertising, as it is the case of the commercial spot, a product that –as seen also by the exemplifications– particularly lends itself to host such an instrument.

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THE PLAYFUL CHARACTER OF CREATIVE ALPHABETS

THE CASE OF COVER ART BETWEEN THE 1930s AND THE 1970s

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UNUSUAL ALPHABETS
LETTERING
GRAPHIC EXPERIMENTS
COVER ART
ARTWORKS

What links Thomas More to Filippo Tommaso Marinetti? And how is the creativity of alphabets related to the cover art of vinyl records? And yet there is a common thread called lettering, which is variously articulated in the expressiveness of the typographic characters of the artists. There is a bi-planarity present in the letters of the alphabet: that of expression and that of content –signifier and signified meaning, but there is also an arbitrariness that does not connect, in any way, one to the other, the will of an alphabet to exist as an autonomous form of art. Lettering is perhaps the most appropriate area of graphics for experimenting, thinking, inventing, narrating and playing with elementary forms. Letters represent an extreme synthesis of the meanings of nature and of geometry and suggest unusual alphabets, prompting us to invent new stories. From the artistic avant-gardes of the 20th century, the playful revolution of lettering also invested the field of music with cover art. Many records are often first remembered, even more than for their music, for their cover art. The graphic design of the covers, moreover, often offers an intuition, at first glance, of the musical genre of the album and the personality of the artist. Today, the graphic design and the imaginative lettering of record covers have now become recognized as true forms of art.

INTRODUCTION

In all periods of history, the characters of writing and lettering have represented and still represent an essential aspect of culture. However, only in a few rare cases is the name of the authors known for the product realized and their art often remains in the shadows. While the names of the innovators in the classic artistic disciplines of all eras, such as painting, music and literature, are part of the general heritage of knowledge, the names of the creatives of lettering are often forgotten. Only in some rare cases are the authors of works of lettering known, although the influence of writing and typography is constantly present in all fields of human activity. Without writing and typography, exchanges of information, which today seem natural to us in terms of quantity and speed, would not be conceivable.

The association between sign and content of writing belongs to the cultural traditions that over time have established its codes and conventions (Frutiger, 1996); we are aware that there is a tension that arises from the relationship between message and image, amplified by lettering. For this reason, the signifier does not only affect the 'readability', but also the meaning that the reader attributes to the entire text. Just as colors activate certain areas of our perception associated with different emotions depending on the type of chromatic frequency we are dealing with, so, too, do characters and fonts stimulate a similar response by our brain.

The way in which something is written –specifically, the type of lettering used– can evoke in the reader a precise framework of perceptions and orient the message towards a specific emotional response.

When we look at a particular typographical character, we do not stop with the simple act of reading, instead, we interpret it. Some studies have defined this approach as 'cross-modal', that is the receptive capacity of our brain to activate and re-elaborate multiple sensory information with visual reading (Merleau-Ponty, 1965).

Similarly, to all aesthetic and social factors, the ability to translate one's own thought into language, and language into text, and text into emotions, has always been a factor of power, and this means that lettering co-determines the message.

Stability and objectivity, that is, tradition, confidence, elegance, as well as creativity, rebellion and hope are feelings that are solicited by the communicative process and, also thanks to a hyper-development of visuality, today we can approach our typographical heritage in a dynamic and conscious manner.

UTOPIA AND CHANGE: THE HISTORICAL CONTEXT AND THE REVOLUTION OF CHARACTERS

Going back in time, Thomas More, in the first pages of *Utopia*, published in Latin in 1516, presents an alphabet composed of 22 letters called Utopian alphabet, perfect in its geometric forms and intentions for achieving absolute happiness; it was created with the elementary forms of the circle, the square and the triangle. Thomas More, creator of the utopian notion of 'living according to nature', felt the profound need to propose his concepts through a writing composed of expressive letters, capable of adequately representing the principles of his theory.

The idea of dealing with alphabets and lettering capable of highlighting the bi-planarity of the signs of the alphabet starts with a 16th century utopianist: that of the expression and that of the content –signifier and signified meaning– which also declares an arbitrariness that can underline the effects of one on the other.

The strength of writing, in addition to the textual meaning, lies in its 'de-sign', a representation capable of tracing links between the visual and the verbal.

In 1914, almost five hundred years after *Utopia*, *Zang Tumb Tumb*, the literary work of the Italian Futurist Filippo Tommaso Marinetti, was published in Milan. In this *poemetto*

inspired by the siege of Adrianople during the Bulgarian-Turkish war, in a mad utopian idea of the conquest of the world and the rejection of conventions, of the exaltation of the struggle and technological progress, the author uses particular printing methods, inserting typographic characters of various sizes, thus creating a visual effect able to carry the reader back to the center of the battle fought in 1912. The text, with a strong visual character, making great use of bold type and italics, is composed of 'words in freedom', a Futurist writing technique disengaged from the literary canons of the time, which provides for the use, furthermore, of onomatopoeic terms suitable to represent in written form explosions and other sounds of warfare.

Utopia perseveres and inspires. From Thomas More to Filippo Tommaso Marinetti, revolutionary thought requires a vigorous expressive need through coherent, significant and strongly communicative graphics. Thus, in the early years of the 20th century, the great revolutionary typographic change was realized, not only with Futurism, but also with the other avant-garde currents, from Dadaism to De Stijl, to Suprematism, Constructivism, the Bauhaus school and more.

Today there are more than five thousand typographic characters and they are used to compose words that in turn correspond to a content. The character is the signifier, that is the graphic representation of the word which, through its modes and types, can expand the sense and the meanings of the text itself[1].

Over time, writing and lettering have undergone numerous additions and innovations, the principle characters have been refined with or without serifs, secondary characters have been generated that define and personalize the signs of the alphabet even more, so much so that, in the typographic forms of each era, the technical and aesthetic advances that distinguish them are denoted.

The intelligent use of typographic design and typefaces is a source of imagination and identity. The lettering indicates the fundamental characteristics of the text: whether con-

temporary or historical, serious or funny, scholarly or entertaining. Often the concordance between typefaces and text is such that the sense of writing prevails over that of reading[2].

THE 'TYPOGRAPHIC REVOLUTION' OF THE 20TH CENTURY

The 20th century was a period of great upheaval, that of changes in all fields, both artistic and cultural. The legacy of past centuries was deliberately put aside to make room for the new. In the liberal arts, this change manifested itself in the transition from figurative painting to abstract painting; various pictorial themes, never practiced until then, met with strong disapproval in the traditional world that later gave rise to alternative avant-gardes. Parallel to this, the idea of the harmony, of the balance of forms and proportions was changing. Typography, which after Gutenberg had only undergone relative evolutions and had remained within the framework of fixed rules, was infected and contaminated by this air of renewal. If until then it had been an orderly medium used for the purpose of reading and writing, it also set itself 'in movement'. Font designers broke away from a purely pragmatic work to create alphabets whose purpose was not only that of being read, but of existing in their own right.

The many interactions between artisan and technique, theory and practice, between functional and experimental designs, have made the study of typefaces one of the most important components of our culture. It contributes to learning and understanding writing and typography in a more conscious manner.

The roots of lettering and modern typography are closely intertwined with 20th century painting, poetry and architecture. Photography, technical changes in development and printing, new reproduction techniques, social changes and new lifestyles helped to break down the boundaries between graphic art, poetry and typography; all these contributed to place typography on a more visual level, less linguistic or

merely linear, and much more communicative. The new vocabulary of typography and of graphic design, from the beginning of the 20th century, in less than twenty years, underwent a radical transformation[3].

At the end of the 1920s, the foundations for a new and different creative phase having been laid, a search, more for consolidation rather than real innovation, continued. However, modern typography was not the fruit of a rapid invention by an individual or an avant-garde group, but, rather, arose as a response to the new demands and new opportunities that the preceding century brought. The violence with which modern typography burst onto the scene starting in the 20th century reflects the aggressiveness with which the new concepts of art and design, in each field, undermined conventions and principles, and attacked attitudes by then outdated in a highly industrialized society.

The typographic revolution was not initially measured against the traditions of industry and business, but it is fitting to remember that the graphics and printing industry had, for some time, been implementing technological research that was more advanced inn respect to traditional printing. The real revolution was supported by painters, writers, poets, architects and cultural figures who approached printing from fields outside the industrial world. These artists were full of ideas and oriented toward a new concept of art and society; they were all determined to make their voices heard in a concrete way and dedicated themselves to printing with great passion, because they acknowledged its fundamental value in the contemporary world, increasingly engaged in the field of communication.

Graphic design and printing represented a great medium for transmitting ideas and information, surpassing what until then had been the area of reference determined by the previous era. It was a question of reconsidering writing as a form of decorative art, the mirror of an evolving society.

The so-called 'typographic revolution', in any case, had to deal with the printing industry, since the rapid growth of

industry and mass production had generated the need to create new forms of printing, also to efficiently control the process of production and distribution; in addition, the great growth of advertising graphics had increased competitiveness and stimuli for production.

The first Cubist compositions painted by Georges Braque and Pablo Picasso in 1908 represented further fundamental steps towards the new horizons. The following year, in 1909, the *Manifesto of Futurism* had an immediate repercussion with great impact on modern typography design, by then ready for innovation.

The Futurists sought new forms that would allow them to overcome the limitations of the two dimensions, for celebrating 'revolution and movement', in resorting to illusory visual effects. The propaganda technique they used, violent and incendiary, was later extensively imitated throughout Europe, from the Dadaists in France, Switzerland and Germany, to the Russian Constructivists, as well as De Stijl in Holland and many others.

POST AVANT-GARDE PASSAGES

Futurists opposed *l'art pour l'art* and at the same time rejected any idea that simply invited them to play with form or to realize typographic innovations just for the sake of doing so. They imposed the fact that in typography form intensified content, going to the extent of creating the literary style of 'words in freedom' or *paroliberismo* which consisted in overcoming the syntactical and grammatical rules of phrases and sentences; punctuation, accents and apostrophes were also abolished.

The principles and rules of this literary technique were identified and written by Marinetti in the *Technical Manifesto of Futurist Literature* of May 11, 1912 and were also taken up again in the subsequent *Destruction of Syntax. Wireless Imagination. Words in Freedom* of May 11, 1913.

"I initiate a typographical revolution aimed at the bestial, nauseating idea of the book of passéist and D'Annunzian verse, on seventeenth-century handmade paper bordered with helmets, Minervas, Apollos, elaborate red initials, vegetables, mythological missal ribbons, epigraphs, and Roman numerals. The book must be the Futurist expression of our Futurist thought. Not only that. My revolution is aimed at the so-called typographical harmony of the page, which is contrary to the flux and reflux, the leaps and bursts of style that run through the page. On the same page, therefore, we will use *three or four colors of ink*, or even twenty different typefaces if necessary. For example: italics for a series of similar or swift sensations, *boldface* for violent onomatopoeias, and so on. With this typographical revolution and this multicolored variety in the letters I mean to redouble the expressive force of words" (Marinetti, 1913).

A revolution, in short, that concentrated the characterizing traits of the new poetic era in the signifier –the typographic characters– more than in the signified meaning –the text; in the container –the book– more than in the content. It is not a coincidence that he had declared again: "Three elements which literature has hitherto overlooked must now become prominent in it: 1. Noise (a manifestation of the dynamism of objects); 2. Weight (the capacity for flight in objects); 3. Smell (the capacity of objects to disperse themselves) […]. Only the asyntactical poet with words set free will be able to penetrate the essence of matter and destroy the mute hostility that separates it from us" (Marinetti, 1913).

The poetic results of that period, in the light of a current re-examination, at times have more historical value than aesthetic taste, and of this, most probably, the first to notice were actually the more sensible Futurists who, in fact, soon evolved towards other forms of writing.

In the post-war period the concept of Futuristic 'words in freedom' came together and was re-amalgamated into other new avant-gardes. A passage from Marinetti's *Manifesto* reads: "Words freed from punctuation will radiate out toward one

another, their diverse magnetism will intersect, in proportion to the continuing dynamism of thought.

A white space, of varying length, will show the reader the pauses or rests of the intuition of their differing lengths. Uppercase letters will inform the reader which nouns contain a dominant analogy. The destruction of the traditional sentence, the abolition of adjectives, adverbs, and punctuation, will necessarily bring about the collapse of the much vaunted stylistic unity, so that the Futurist poet will at last be able to make use of every kind of onomatopoeia, even the most raucous, that eco the countless number of sounds made by matter in motion" (Marinetti, 1913).

Typographic freedom was achieved through a multiple and multiform collocation of the word, which can be written in different ways and with different characters, arranged according to variable lines –vertical, oblique, curved, sinuous– broken down and disjointed in its components up to the use of a figure.

Towards the end of the 1930s, while graphic design was in full development, after the experiences of the Futurists, Constructivists, Neo-Plasticists, Functionalists, Bauhaus, etc. Marinetti himself could rightly note that the 'words in freedom' had not only conditioned the new art of typography but, by influencing advertising, had in fact conquered the urban environment; the new means of visual communication such as posters and notices, advertising, are still affected today by Futurist philosophy which, indeed, is exasperated by the electronic devices of the end of the century. Visual advertising is futuristic in its graphics and content; its compositional oddities, literary transgressions, neologisms, conceptual flights of fancy are announced in Marinetti's *Manifesto* because he, at the dawn of the 20th century, had already sensed the development of graphics in the field of communications.

Commercial companies, on the other hand, demanded increasingly concise advertising, with a clear message and a strong communicative impact. Posters became an exceptional training ground for the revolution of 'words in freedom'. In ur-

ban environments, advertising, and its typographic plasticity with perspectives, elevations, different depth planes, with its free spelling, its disruptive movement of verbs eluding syntax and literary habits, gave life to 'words in freedom'. These were seen in flashing lights running across the pediments of buildings and the terraces of houses. During this period, the Futurists created pieces of *Parolibero* mural poetry, accompanying the realizations with a reflection on typographic art, a theme that also involved specialized magazines, such as *Campo grafico*, *Graphicus* and *Typographische Monatsblätter*, where Futurism was given the merit of having opened the way to the work of contemporary graphic artists[4].

CHARACTERS AND MUSIC: COVER ART

From the first steps of Modernism, visual art and music formed a symbiotic relationship. From Henri Matisse's *Music* (1910) to the 'sound poetry' of Hugo Ball *Karawane* (1916) to the visual *Reciprocal Accords* by Wassily Kandinsky (1942), the 20th century gave rise to increasingly fruitful encounters between sounds and forms, signs and melodies, compositions and visual performances.

Typographic research remained no stranger to the immense field of visual communication and found itself occupying a role of great importance, expressed through album covers which, between the 1930s and 1970s, had a real artistic explosion. A period that represented a rich source of trends, novelties, experimentations with fonts, graphics and logotypes. Each genre of music holds within itself unique peculiarities, eccentricities, or minimalist rigors, references

Fig. 1 Alex Steinweiss, cover art for some album, (from left) *Smash Song Hits* by Rodgers & Hart, *Eroica* by Bruno Walter, *Boogie Woogie* compilation, *At the piano* by Frankie Carle, 1939-1945 (Spampinato, 2017).

to writing or to the most avant-garde forms of visual art. In this field, the font has assumed a substantial role in the visual communication of covers, a point of reference that must aim to reflect the soul of the artist and his music. Frequent is the use of characters that are not part of font families, but are used in an altered way: they are manipulated, deformed, re-invented to become unique, as unique as the music they intend to communicate.

ALEX STEINWEISS, "I WANTED PEOPLE LOOKING AT THE COVERS TO HEAR THE NOTES"

Before music videos were invented, it was album covers that made music 'visible'. Vinyl records offered a space of just over 30x30 centimeters, where photographers, designers, painters and typographers could give free rein to their talent and inspiration, and also produce real works of art.

Alex Steinweiss, artistic director of Columbia Records, started a real revolution in the recording field in 1939, proposing to his record company the introduction of an illustrated record cover. Until then, in fact, vinyl records did not have a cover but were sold in monochrome sleeves, totally anonymous, which served to protect them from dust.

The introduction of personalized covers immediately made record sales skyrocket: emblematic was the case of a re-release of Ludwig van Beethoven's *Symphony No. 3 Eroica*, whose graphic re-visitation increased sales by about nine hundred percent. Since then, record covers have become increasingly popular and some of them even legendary.

Many records are often first remembered, even more than for their music, for their cover art. Their graphics often let you intuit, at a glance, the musical genre of the album; the covers of vinyl records have become an integral part of the album they hold and, today, the graphic and structural design of covers is now recognized as a true form of art, cover art (Iuppariello, 2012).

For over three decades, Steinweiss produced thousands of original classical, jazz and pop music records for Columbia, Decca, London and Everest, as well as logos, labels and advertising material. He inaugurated the golden age of cover design and influenced the generations of designers who came after him. From the very beginning, the combination of images and lettering constructed by Steinweiss created an important graphic coherence and the characters, often hand drawn, contributed to giving impact to the content of vinyl records (Figure 1).

MUSIC AND ARTWORKS BETWEEN SOCIAL PROTEST AND MARKETING

The year 1967 was crucial not only in the relationship between art and youth music, but above all for the role that pop music assumed as a new vehicle of expression and communication for the new generations.

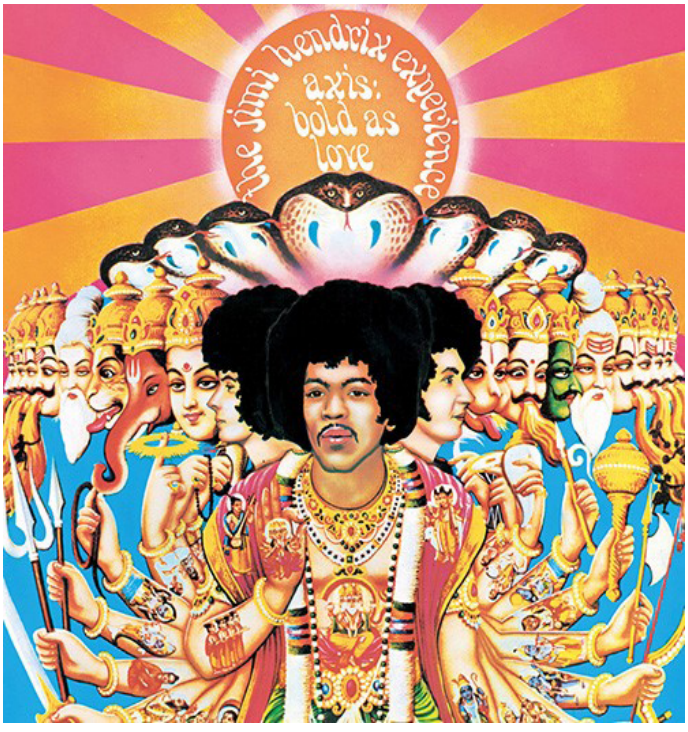

Fig. 2 Roger Law & David King, cover art for the album *Axis: Bold as Love* by Jimi Hendrix Experience, 1967. Retrieved May 4, 2020 from https://en.wikipedia.org/wiki/Axis:_Bold_as_Love#/media/File:Axiscover.jpg.

Fig. 3 Peter Blake & Jann Haworth, cover art for the album *Sgt. Pepper's Lonely Hearts Club Band* by The Beatles, 1967. Retrieved May 4, 2020 from https://www.moma.org/collection/works/185449.

At the end of the 1960s, young people assumed, for the first time in history, full self-awareness as a social group and potential actors of change. It was in fact the uprisings of university students that in the mid-1960s stirred up turmoil on American campuses with protests regarding the issues of civil rights, racial discrimination and the Vietnam War.

From there, protest demonstrations spread all over Europe –from Paris to Prague, from Rome to London– where the dream of freedom coming from those boys and girls born after the Second World War had to be acknowledged. It was that generation –even amidst utopias, contradictions and false starts– that changed the public and the private realms, and pursued new languages of art.

In this scenario, music had a fundamental role, as it became one of the most effective means of expression and communication. Music not only represented a source of inspiration for visual art in those years, but was also seen by artists

as a way to expand the scope of their research and to reach a wider and more general public. Likewise, musicians, singers and bands saw art as a source of inspiration, but they also understood that art could allow them to deepen the intellectual scope of their production. The record, therefore, became the herald of an imaginary countercurrent expressed through music, words and images, while still remaining a commercial product, accessible to the masses.

PSYCHEDELIC STYLE AND INDIAN INFLUENCES

In the 1960s, in the years of counterculture, a strong artistic current of rupture with the past developed, in preference of an escape from reality through hallucinogenic experiences. Psychedelic visual arts played an important role in pop and rock music[5]. Concert posters, album covers, liquid light shows, fluorescent light art and more not only reflected the kaleidoscopic color patterns of synthetic drug hallucinations, but also revolutionary political, social and spiritual feelings, inspired by insights resulting from altered states of consciousness.

In an overview of some of the most famous covers in the American world of those years, we would like to dwell on the political use, as a means of peaceful revolt, that some artists wanted to promote, thanks to the coordinated use of images and lettering.

The case of Jimi Hendrix, for the cover of the long-playing album *Axis: Bold as Love*, realized by the illustrator Roger Law and the graphic designer David King, presents a strongly alternative and 'anti-American' image (Figure 2). The band was depicted as Hindu gods on a cover inspired by a religious poster entitled *Viraat Purushan-Vishnuroopam*; the characters of the titles, inscribed in a sun, create an impression of belonging to precise identity orientations, and re-propose Tamil or Malayan calligraphy to give a further idea of energy and innovation, or of protest.

ALPHABETS AND BRITISH POP ART

After the Second World War, all those objects of common use that had become the new symbols of consumer society came into play in the world of art; an idea of popular art, called Pop Art, which unlike the other artistic movements that developed in this period, generated social criticism through the decontextualization of these objects, emphasizing their playful and creative aspects[6]. The urban environ-

Fig. 4 Arthur Wood, cover art for the album *A Wizard, a True Star* by Todd Rundgren, 1973. Retrieved May 4, 2020 from https://www.discogs.com/it/Todd-Rundgren-A-Wizard-A-True-Star/release/3774323.

ment in which this new form of expression took shape was characterized by a pervasive idea of commercial consumerism, sometimes enslaved by it, sometimes in contrast. The city in which Pop Art was born is described as an aggressive place, full of contradictions and false idols, but also reassuring, capable of assuming a lively, familiar role (Barthes, 1992; McLuhan, 2008). The recognized founder of British Pop Art is Richard Hamilton[7] –besides Peter Blake– who in 1967 created the cover art of the Beatles' *Sgt. Pepper's Lonely Hearts Club Band* LP, perhaps the most celebrated work in the history of music, considered an authentic pop icon (Figure 3).

The art of the collage and of the consequent decontextualization of the images creates a complex vision, full of references, but the part with lettering, which would appear relegated only to the writing on the bass drum, is precisely what gives order, offering a key to the understanding of the images, thanks to its position at the center of the composition. The parterre at the bottom presents the writing 'Beatles' realized in red flowers, creating a strong chromatic contrast with the false blue sky in the background and, on the right, the same flowers placed in a circle create a small 'o' that fueled the urban legend of Paul McCartney's hypothetical death[8].

FANTASY CHARACTERS AND THE ONIRIC DIMENSION

One aspect that is often exalted by the graphics and lettering of the vinyl records of the 1960s and 1970s, is the desire for an escape into fantasy, away from the real world, in search of wonderment. There is an inseparable link between music and Fantasy. Many traveled in search of a hippy-like escape, re-evaluating the philosophy of the journey celebrated by Jack Kerouac and of the western world's dream of adventure, as well as the return of Fantasy as a thought of protest.

The first references to Fantasy can be intuited in the two parallel movements of the second half of the 1960s, on the one hand, the psychedelic movement of the early Pink Floyd,

Grateful Dead and Quicksilver, and on the other hand, the more folksong sounds of artists such as Gryphon, Fairport Convention and Jethro Tull, more interested in the romantic aspect of Fantasy thinking. But in addition to psychedelia and folk, there was also horror, magic, the imponderable, the esoteric. Among the latter we have chosen the cover of one of Todd Rundgren's most beautiful works, *A Wizard, a True Star*, realized by Arthur Wood (Figure 4). The cover has the charm of a Fantasy cartoon, and is an intense mix of geometry, surrealism, and references to Pop Art. The writings on the dice thrown up into the air form the magic of the title and some of the letters seem reflected in a mirror, all in a context of geometrical figures, marbles and dice floating above the doubled figure staring into empty space. It is interesting to note how the theme of utopia celebrated by Todd Rundgren winds through his projects, as in the name, *Utopia*, given to his rock band.

CONCLUSIONS

This brief excursus on art album covers and their bold, imaginative, creative lettering follows the rhythm of a particular strand of cultural history. Even today, in the field of music, the branch of lettering has a movement that shows no sign of stopping. The covers of vinyl records, like those of CDs, reveal how modern, postmodern and conceptual art, as well as Pop Art and Street Art, have flooded this sector of visual production and accompanied the mass distribution of music with often memorable images that instinctively evoke a sound experience. The accompanying text is 'harmoniously' in line with the experiments in cover art realized by Jean-Michel Basquiat, Banksy, Damien Hirst, to name the most recent; an artistic experience shared earlier by Salvador Dalí, René Magritte, Andy Warhol, Robert Rauschenberg and many other artists, graphic designers and type designers. Just as the authors of many artistic works have expressed the

best of an era, in the same way many artists, creators of characters, have given the words of their time the most appropriate and communicative form.

They are characters that dance and compose harmonies for the mind, wonderful letters that compose words and phrases, those that remain there to cultivate and enrich our time with culture.

NOTES

1 The study of visual languages, painting, photography, spatiality, television, advertising, etc., use a semi-symbolic semiotic functioning to produce their texts, regardless of the subject matter of the expression they use or the content they convey. Think of the case of newspapers, which customarily play with the body of their headline typefaces to give more or less prominence to a news item.

2 *Pogo*, an American comic strip created by Walt Kelly in 1943, famous for examples of expressive typography. The author, to express the flowery eloquence of the local politician Mr. Bridgeport, used a wide selection of different 19th century fonts to compose an election banner.

3 Grafica editoriale. (n.d.). In *Enciclopedia Treccani online*. Retrieved May 4, 2020 from http://www.treccani.it/enciclopedia/grafica-editoriale_%28XXI-Secolo%29/.

4 Among the most well-known: *La Città Futurista* (1928-1929), *La Città Nuova. Quindicinale di arte-vita* (1932-1934), *La Terra dei Vivi. Turismo arte architettura* (1933), *Stile Futurista* (1934-1935) and *La Forza. Mensile dei Gruppi Naturisti-Futuristi Italiani* (1935) are essentially architecture magazines originating in Turin within the activities of the *Edizioni Sindacati Artistici* and very similar to each other in their graphic design. *Stile Futurista* was the only one with a rotogravure format, in coated paper and in color. In each of these modern publications there are announcements, posters, theoretical and programmatic texts aimed at exalting the most recent achievements of the Futurist movement.

5 The word 'psychedelic' (coined by the British psychologist Humphry Osmond) means 'manifestation of the mind'. With this definition, all the artistic efforts to describe the inner world of the psyche can be considered 'psychedelic'.

6 As, for example, Happenings and Neo-Dada phenomena.

7 Think to Richard Hamilton's 1954 collage *Just what is it that make today's homes so different, so appealing?* .

8 The cover fueled the legend of Paul Mc Cartney's untimely death through graphic signs and cut out images of objects that could indicate clues or messages, including the flowers used in the place of letters.

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

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ESSAY 35/02

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,

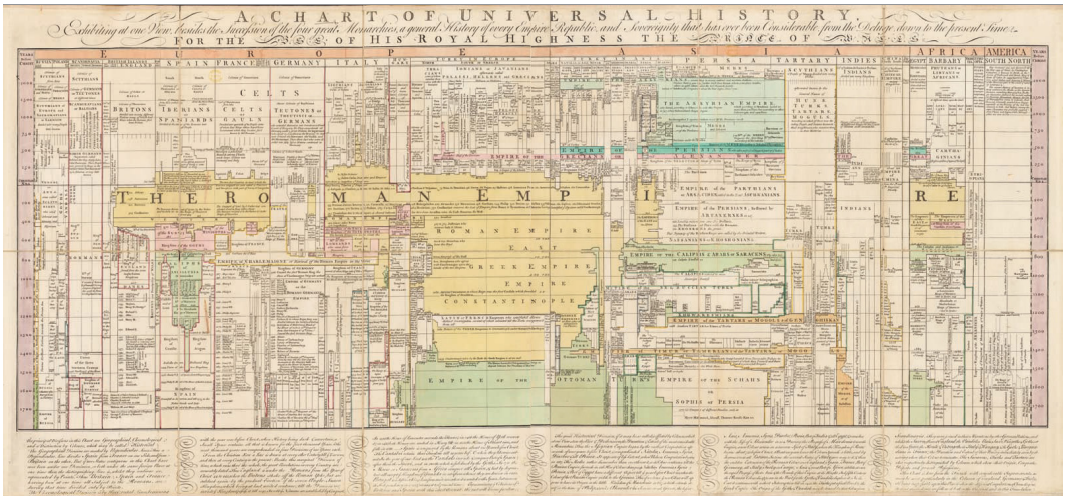

Fig. 1 Thomas Jefferys, *A chart of Universal History*, 1753.

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.

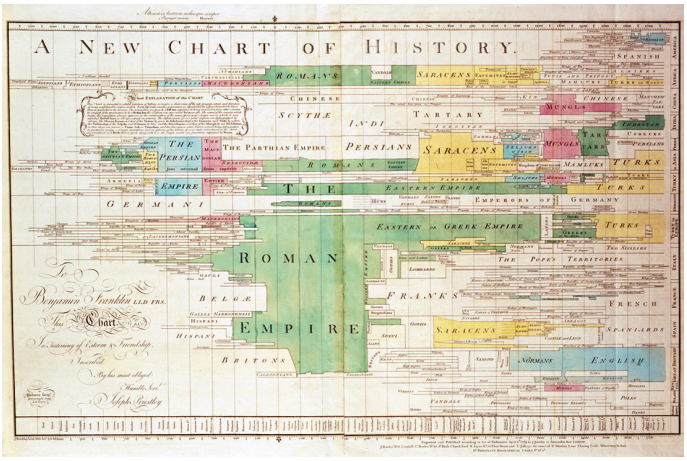

Fig. 2 Joseph Priestley, *A New Chart of History*, 1769.

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).

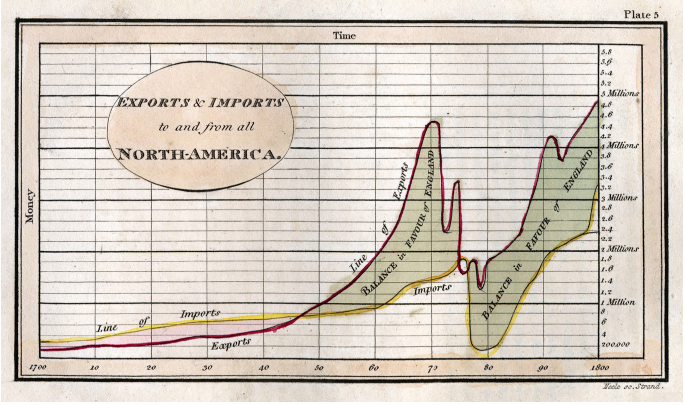

Fig. 3 William Playfair, *Exports & Imports to and from all North America*. In *The Commercial and Political Atlas*, Plate 5, 1786.

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

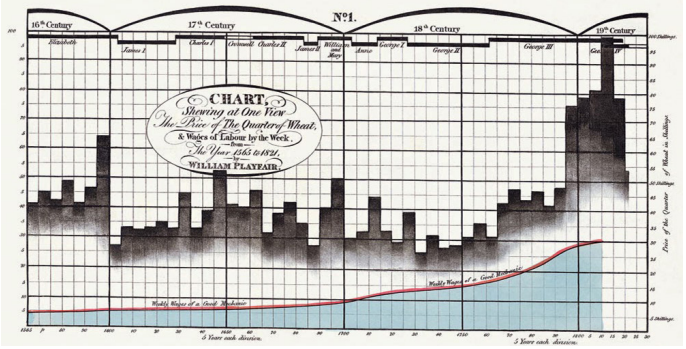

Fig. 4 William Playfair, *Chart, Showing at One View The Price of the Quarter of Wheat, & Wages of Labour by the Week from The Year 1565 to 1821*, 1821.

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

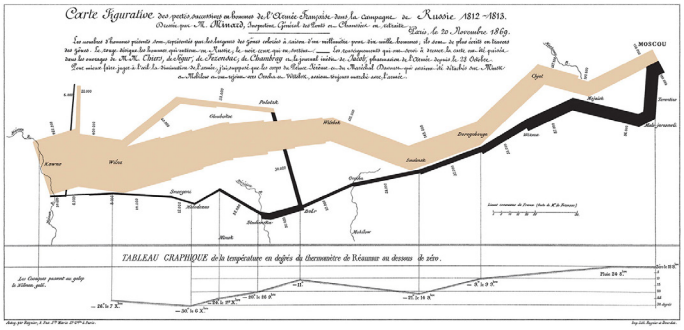

Fig. 5 Charles Minard, *Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813*, 1869. Minard's map, while based on rigorous data –the number and positions of the soldiers during the march with temperatures progressively encountered– nevertheless has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

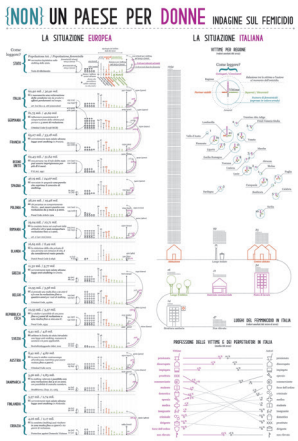

Fig. 7 Marco Bernardini, Marco Vecchioni and Chiara Veneruso. *(Not) a Country for Women. Investigations into Femicide*. Sapienza, Atelier of Public Design, Professor Elena Ippoliti, tutor Giulia Santucci, academic year 2013-2014. The theme of the year on opportunities and gender differences was addressed 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).

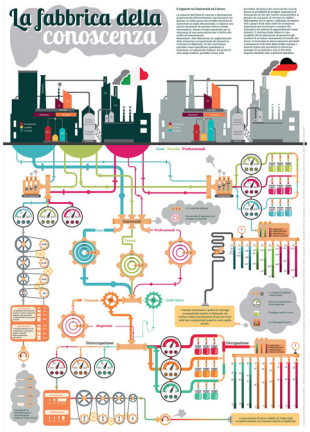

Fig. 8 Chiara Grossi and Giulia Giannarini. *La fabbrica della conoscenza*. Sapienza, Atelier of Public Design, Professor Elena Ippoliti, tutor Giulia Santucci, academic year 2016-2017. Data at hand, the infographic recounts, by means of a figurative graphic, the state of the university system, exposing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

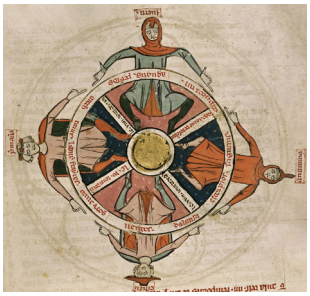

Fig. 10 The cyclical time. *Breviari d'Amor*, XIV sec., British Library, ms. Royal 19 C I f. 54v.

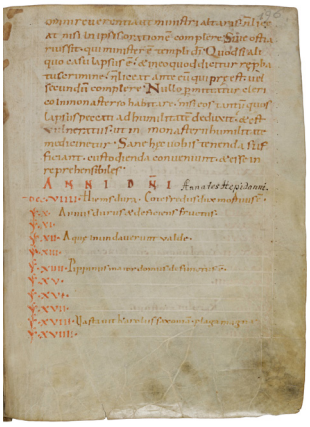

Fig. 11 *Capitolario*. The oldest *Capitolario* of the abbey of San Gallo, containing, among other texts, the Annals. St. Gallen, Stiftsbibliothek, Cod. Sang. 915, IX-X sec. Retrieved April 27, 2020, from https://www.e-codices.ch/it/list/one/csg/0915

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).

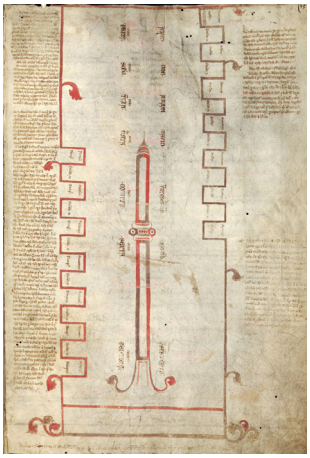

Fig. 12 The arrow of time. Gioacchino da Fiore, *Liber Figurarum*, Plate 18, XIII sec., Digital Bodleian Oxford. Retrieved April 27, 2020, from https://digital.bodleian.ox.ac.uk/inquire/p/118a90ea-d34a-41d7-bf95-7bc5a975402f

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

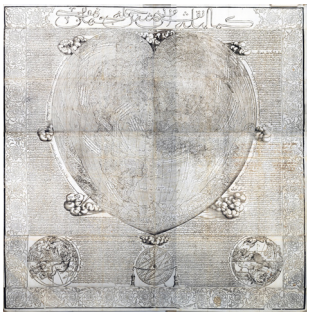

Fig. 14 Turkish-Venetian cordiform world map, second half of the sixteenth century. The 'heart-shaped' maps produced in the sixteenth century differ with respect to the theory of cordiform projection described by the German mathematician Johannes Werner in *Libellus de quatuor terrarum orbis in plano 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.

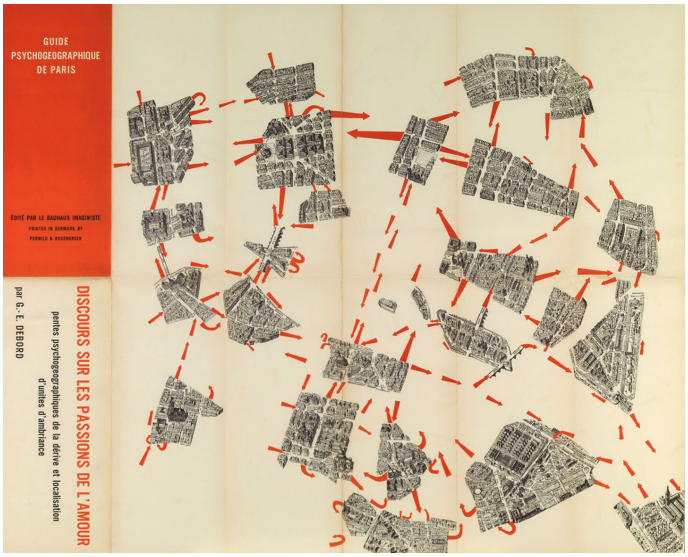

Fig. 15 Guy Debord, *Guide psychogéographique de Paris. Discours sur les passions de l'amour: pentes psychogéogrphiques de la dérive et localisation d'unités d'ambiance*, 1957.

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*.

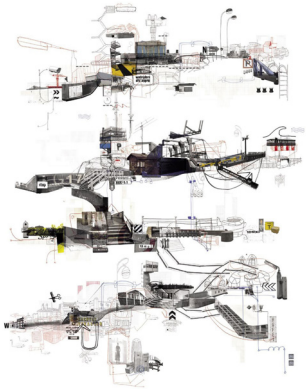

Fig. 17 Frank Dresmé, *Transecting Amsterdam. Project 360°*, 2007. Retrieved April 27, 2020, from http://www.bldgblog.com/2015/06/transecting-amsterdam/

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

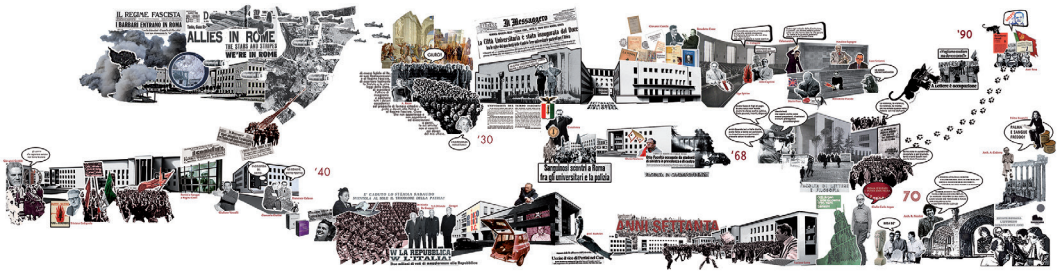

Fig. 20 Marco De Francesca, Master's Thesis, with Elena Ippoliti, supervisor, and Giulia Santucci, tutor, academic year 2013-2014. *Narrative Panorama of the Sapienza in the University City of Rome*. The narration on the human sciences from 1935 to 2015: events, people, buildings.

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.

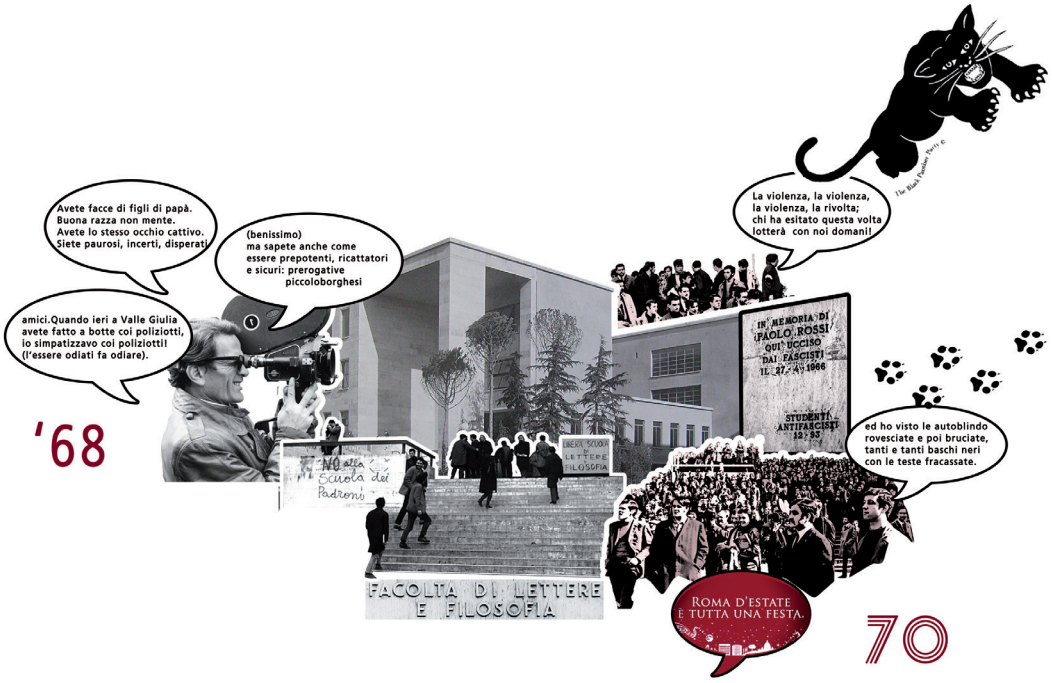

Fig. 21 Marco De Francesca, Master's Thesis, with Elena Ippoliti, supervisor, and Giulia Santucci, tutor, academic year 2013-2014. *Narrative Panorama of the Sapienza in the University City of Rome*. A scene-episode from the Narrative Panorama about the human sciences: the '68.

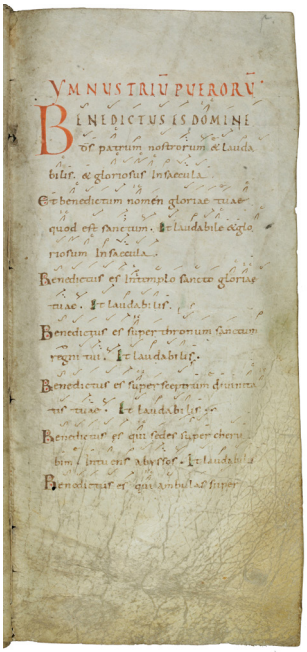

Fig. 22 *Il Cantatorium* di San Gallo, the oldest complete musical manuscript with Medieval neumatic notation. Copied and adorned with elegant neumes in the San Gallo monastery between 922 and 926. St. Gallen, Stiftsbibliothek, Cod. Sang. 359, f. 5 and f. 26, www.e-codices.ch

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.

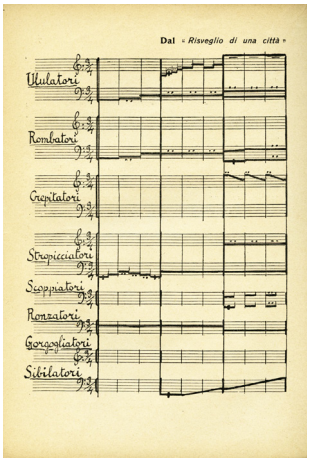

Fig. 23 Luigi Russolo, *Risveglio per una città per intonarumori*, 1913. Retrieved April 27, 2020, from https://www.comune.modena.it/salastampa/archivio-comunicati-stampa/2016/9/201cmodena-futurista201d-e-intonarumori-al-festival-filosofia

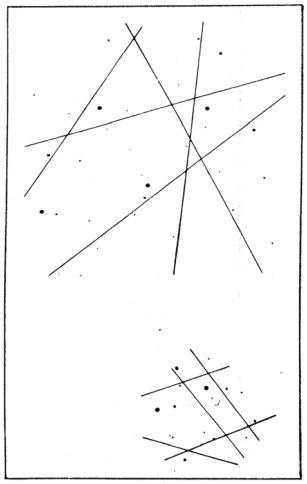

Fig. 24 John Cage, *Variations I*, 1961. In Cardini, 1981, p. 147.

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.

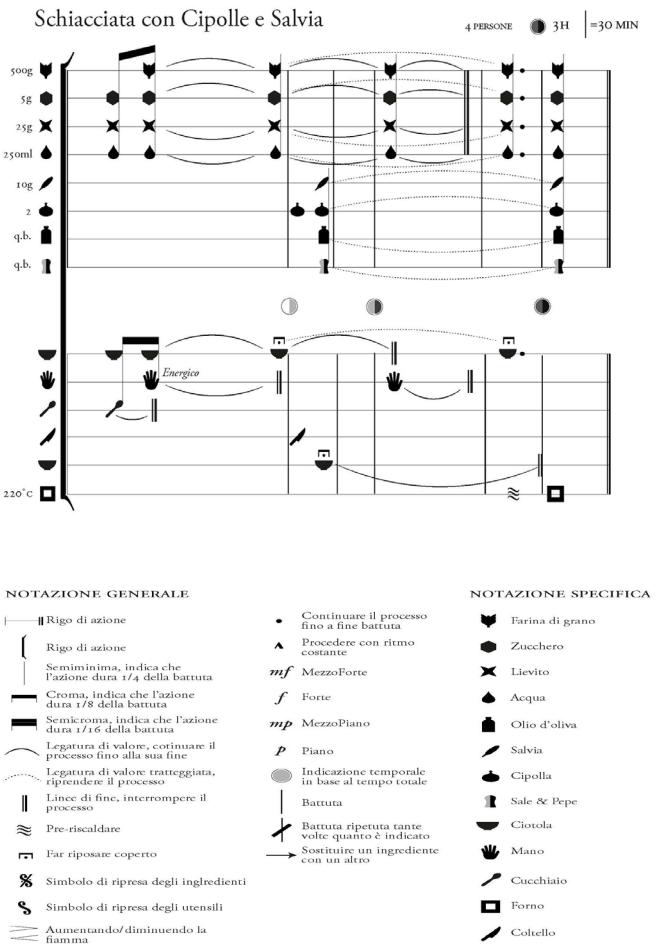

Fig. 25-26 Francesca D'Antonio with Massimo Costanzi, Elena Ippoliti and Eleonora Ippoliti, *Spartiti culinari, Schiacciata con cipolle e salvia*. This experimentation was carried out for the show *Guarda cosa mangi! Food Design Marathon to Expo 2015*, Perugia 2015, June 6, and tells a story based on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

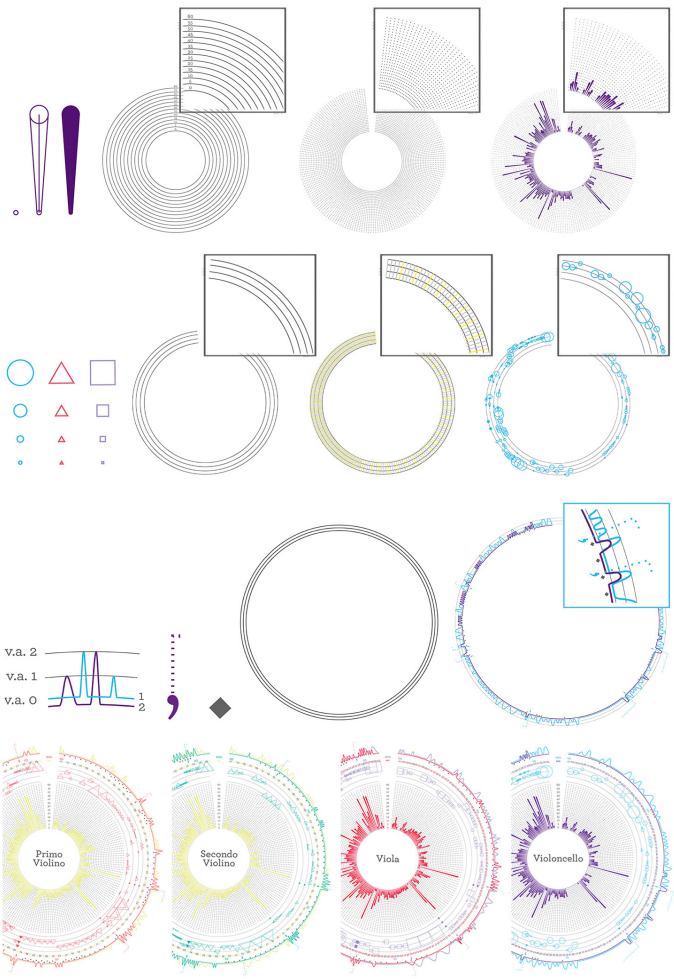

Fig. 27 Manlio Massimetti and Angela Testa, Master's Thesis, with Elena Ippoliti, supervisor, academic year 2017-2018. *Quartetto Sincronie performing Beethoven op. 74, num. 10*. The design phases of the syntagmas and the specialized figures, one for each musician/instrument

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

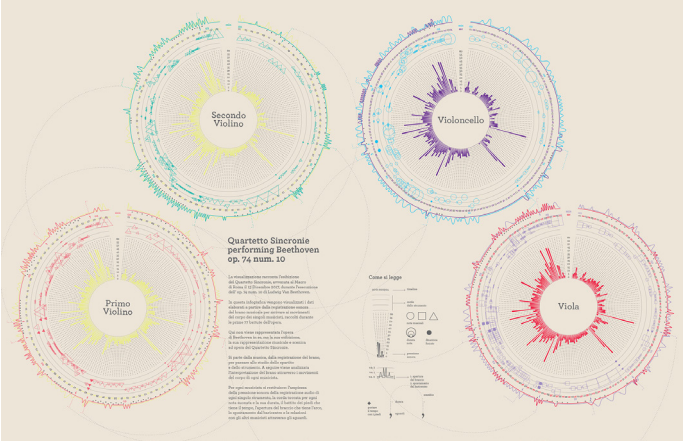

Fig. 28 Manlio Massimetti and Angela Testa, Master's Thesis, with Elena Ippoliti, supervisor, academic year 2017-2018. *Quartetto Sincronie performing Beethoven op. 74, num. 10*. The composition of infographic.

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).

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VISUAL LEARNING AND EDUCATION FOR AUGMENTED REALITY ENVIRONMENTS

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ESSAY 36/02

VISUAL LEARNING
VISUAL PERCEPTION
AUGMENTED REALITY
IMMERSIVE TECHNOLOGY
DIGITAL LEARNING ENVIRONMENTS

Studies on the neurosciences and the cognitive sciences have shown the existing interconnections between visual perception and cognition in the knowledge/interaction with the world. It is recognised in particular how the perception of the information in the multimedia format can improve the teaching-learning processes. With reference to the neuro-cognitive and cognitive aspects, I will focus my attention on visual learning, with particular regard to the use of augmented reality technologies. The present contribution aims specifically to identify the elements of tangency between visual educational perspectives and the construction/use of augmented digital environments.

NEUROSCIENCE, VISUAL PROCESSING AND DIGITAL TECHNOLOGY

Within the scope of the scientific literature, the most recent studies on neurosciences and didactics converge towards some aspects and principles that redefine the knowledge acquisition processes in relation to a style of visual and multimedia learning. In fact, the workings activated for the understanding of the world involve sensorial, visual, perceptive, motor, empathetic and emotive aspects. The visual channel is controlled and oriented by the movements of the body and interacts with other sensorial forms within a common environmental field (Damiani, Santaniello & Paloma, 2015).

An active comparison with the new scientific models can therefore impact the design of 'neurodidactic' interventions (Rivoltella, 2012; Damiani, 2012; Compagno & Di Gesù, 2013), also in the light of the practices initiated in diversified learning contexts through the use of the digital technologies. In the exploration of the body-environment interconnections, there emerges an ever-greater recognition of the rooting of knowledge in the body-brain. In that sense, Varela (1990) underlines how cognition is founded upon the motor-sensorial system: the world is not something that is 'given' to us from the outside, but we take part in it through the way in which we perceive and move in space. As shown by the developments in the neurosciences, cognition can be identified as 'enation': sensation, perception and action constitute a unitary device of the body-brain addressed to knowledge and interaction with reality (Varela, Rosch & Thompson, 1992; Gallese, 2007; Chemero, 2009). In this regard there is talk of embodied cognition, that is 'embodied' knowledge and based on the integrated and multisensorial experience with the world (Sozzi, 2015). The theory of multiple intelligences of Gardner (1983; Gardner & Hatch, 1989) and Beauport (1994) refers to this conception; they recognise the presence of multiple intelligences connected to different specialised cerebral areas. Hence, alongside the logico-mathematical

and linguistic intelligence, tied to the activity of the parietal lobes, the left frontal lobe and the Broca area, there is the musical intelligence, mainly located in the right hemisphere and the corporeal-kinaesthetic, which depends on the activity of the cerebellum, the thalamus, ganglia of the base and from which depend the body's posture and movements. Last but not least, the visual-spatial intelligence allows us to recall images and pathways and is correlated with the activity of the right hemisphere. Specifically, the neuroscientific studies have detected the relationship between visual strategies and spatial strategies: the visual narrative representations without visuo-spatial, schematic and sequential references, do not allow for the construction of a mental model of the problem to be resolved, while the dynamic schematic-visuo-spatial representations turn out to be adequate to the problem-solving capacity (Passolunghi, Vercelloni & Schadee, 2007).

These studies refer to a specific branch of the neurosciences, the Visual Neuroscience that focuses on the visual system of the human body, with the aim of understanding the neural activities with respect to the processes of visual perception, besides the behaviours dependent on vision (Gegenfurtner, Kok, Van Geel, de Bruin & Sorger, 2017; Chen, 2019). In regard to this sector, some research into perception and visual learning style have focused on how the visual information can have an impact on the acquisition and the transmission of knowledge (Feldges, 2016). Specifically, the concept of learning style (Falcinelli, Gaggioli, & Capponi, 2016) refers to an individual way of acquiring information that privileges a certain sensorial channel. The plasticity of the brain means that it is capable of adapting to the different stimuli that it receives from the outside in wholly personal ways (Wolf & Barzillai, 2009). As a matter of fact, the information on a given argument are not necessarily acquired holistically by the student, but rather the preferences for some sensorial modes is recorded. Fleming (2009) defines four learning styles, that is four modes of information take-up: visuo-verbal (based on the written language), visual-non-

verbal (based on images, figures, diagrams, schemes), auditory (based on listening); kinaesthetic (based on the direct experience of things through manipulation and movement). Petty (2009), instead, identifies a modality of information acquisition of a visual, auditory and kinaesthetic nature. The former thus stresses the cognitive elaboration at a linguistic/semantic level. The second underlines the receptive capacity to perceive internal (kinaesthetic) and external (visual/auditory) stimuli. Particular attention has been reserved to the study of the visual learning style to assess its educational impact in terms of the reinforcement of knowledge acquisition. Indeed, the capacity to see is the dominant sensorial system in man, occupying between 20 and 30% of the cerebral cortex area (Van Essen & Drury, 1997; Van Essen, 2003). Human beings elaborate visual-non-verbal elements faster as compared with the verbal ones and every day they come into contact with a huge number of images and visual representations: digital charts, infographics, maps, signs, videos, diagrams, illustration, etc. (Salvetti & Bertagni, 2019). One tends to remember about 10% of what one listens to, about 20% of what one reads and about 80% of what one sees (Rizzolatti & Sinigaglia, 2008; Collins, 2015; Gazzaniga, 2009; Kandel, Schwartz, Jessell, Siegelbaum & Hudspeth, 2013).

Specifically, Feldges (2016), investigating what happens inside the nervous system when one's eyes receive visual stimuli, points out how learning derives from the fusion of two neural perceptive processes based respectively on the recognition of objects and the representation of forms (Bear, Connors & Paradiso, 2006) and on the perception of moving objects. This distinction reported in the educational contexts, refers to forms of learning supported by two different visual flows: fixed images and dynamic images. Indeed, the former flow of information allows one to understand the aspects linked to the visual perception of a static image, but does not provide accurate explanations as to how we actually perceive the world that presents as a continuously evolving and ever-moving environment. Thus, it is shown how the educational

practice that pays particular attention to the use of fixed images should also stimulate the student by recovering the action of the body within a given space (Lumbelli, 2012; Bruni, 2013). In relation to these themes, the centrality of the neurosciences emerges in the study and in the implementation of the augmented reality technologies (AR), with particular reference to the knowledge both of the possibilities and the limits of our sensorial systems, and the cerebral responses deriving from the interaction of forms of mixed technology which in turn can give new information on cerebral functioning. The immersive experiences realised in an AR environment pose precise questions as to the perceptive mechanisms that underlie it. Indeed, AR is recognised as having an important action of mediation between the brain and the physical world thanks to the sensorial and cognitive wealth of the user's experience. In a continuous reciprocal exchange, neuroscience provides an understanding of how the use of AR technologies can influence the brain by allowing for the reconstruction/integration of reality starting from the sensorial perception, at the same time augmented reality provides neurosciences with new ways of testing theories and concepts relating to complex cognitive and perceptive phenomena, in particular visual, spatial and kinaesthetic, simultaneously recording and monitoring the changes in the cerebral activities and behaviours (Baldassi, Kohno, Roesner & Tian, 2018).

VISUAL LEARNING

Visual learning lies at the heart of a long debate on its cognitive implications and potentialities (Arnheim, 1969; Cardarello & Contini, 2012; Clark & Lyons, 2010; Landriscina, 2011, 2012; Mayer, 2003, 2009; Novak, 2010; Panciroli, Macauda & Corazza, 2020; Paoletti, 2011) which attributes to the images the fundamental role of "didactic catalysers" (Farnè, 2002, p. X) as the principal form of expression and comprehension of the world towards a more meaningful learning.

It is particularly starting from the late nineteen seventies that some sectoral studies have started to deepen the iconic code, the relation between word and image, the audio-visual communication and successively multimedia, paving the way to a tradition of pedagogical reflections on the role and the characteristics of the languages and the audio-visual media in education (Calvani, 2011; Cescato 2017; Galliani, 2014; Rivoltella, 2012; Vivanet, 2015).

Several studies have, however, shown that graphic-visual communication can determine two typologies of interdependent risks: decorativism and cognitive overload. Decorativism refers to the introduction of images not directly correlated to the principal content of the written text or the lesson, capable of producing a cognitive overload (Clark & Lyons, 2010), adding a significant component of distraction. From here the tendency to overlap the written text on the image: the verbal description precedes and even influences the visual reading, to the extent that in different school textbooks a rather limited space is reserved to images. Indeed, a diffuse practice is that of teaching to read and "to analysing the texts of books, but not the illustrations. Although the latter fulfil an illustrative purpose complementary to the graphic-verbal message [...], they are prevalently perceived as some *pleasant interruptions* that segment the reading" (Nuti, 2012, p. 9), thereby deprived of their own semantic autonomy in respect to the verbal content. Far from this position, Ferretti observes how "an illustrated book, also a school textbook, can function through images alone, independently from the text" (2003, p. 40). A controlled use of the images can indeed support the learning process through the adoption of some devices that lead to: focusing attention on the fundamental elements to minimise the cognitive effort and to make prior knowledge emerge; supporting the transfer of knowledge and the construction of mental models; stimulating motivation (Clark & Lyons, 2010).

The images (photos, conceptual maps, charts, graphs) can acquire the characteristics of a scaffold supporting the construction, organisation and re-elaboration of knowledge.

In this regard, the studies on multimedia learning have led to defining some fundamental principles (Mayer, 2003; 2009): words and images are associated (principle of multimediality); contents extraneous to the pre-set objectives are excluded providing contents that are relevant and coherent between them (principle of coherence); words and images that refer to the same contents are situated close together so as to integrate the information in an immediate way (principle of spatial contiguity); the images are accompanied with texts in audio format rather than written so as not to saturate the visual channel (principle of modality); the same informational contents are not presented in different formats (principle of redundancy). In this regard, Laurillard (2014, p. 147) distinguishes n intrinsic load due to the characteristics of each media and an extrinsic load that depends on the quantity and the choice of the visual and multimedia materials and their organisation, suggesting operating towards a pertinent cognitive load. It is not "the number of media present that impacts positively or negatively on learning, but the rationale used in connecting the various media (the graphic organisation in the single media, the choice of media products as a function of the communicative aims and the readers' competencies, the choices topologically adopted to spatially organise the various media) and the attention to the mediation process" (Rossi, 2016, pp. 16-17).

The value of some typical aspects of the visual data is thus recognised, such as: 1. the simultaneity and contextualisation of the information that they enclose in respect to a precise reality; 2. the efficacy of the images, and as source of information; 3. the persuasiveness of the images that catch the eye and evoke emotions (Cescato, 2017). The latter aspect refers to the aesthetic-emotional dimension tied to the "pleasure principle, to the fact that looking at the figures [...] is first of all constituted as sensible experience that activates in the subject visual pleasure, a springboard for fantasy and imagination" (Farnè, 2002, p. XI). Within the scope of the process of mediation (Bruner, 1966; Damiano, 2013) which is born from the need to create a bridge between experience

and abstraction, between taught knowledge and learned knowledge (Rossi, 2017), images occupy a significant place as *iconic* mediators, alongside other typologies of mediators: the actives, the analogics and the symbolics. In this way, it is possible to "propose multiple representations of the studied concepts, to reify from one time to the next the studied concept at different levels of abstraction" (Rossi, 2017, p. 14). Specifically in regard to the iconic mediators, the degree of iconicity of an image is a function of the degree of verisimilitude or abstraction chosen in the representation. The images are made up of "elements (lines, forms and colours), organised according to models of similitude with the referent, where it can be a real object (the photograph or drawing of a table resemble the real table) or a mental model, understood as a graphic organiser that visually expresses relations of proximity, inclusion, sequence" (Menichetti & Sarro, 2015, p. 76). The images can transmit knowledge concerning factual objects, but they can also transmit abstract concepts (justice, trust, loyalty, care, etc.) (Feldges, 2014; Feldges & Pieczenko, 2016). Also, the images can be real or fictional, represented and described by and in the verbal texts. In fact also "the texts are always accompanied, in one way or another, by associated images, implied images, latent or inserted in the body of the text […] and even by images of the 'imaginary museum' of every reader, made up of memories, transpositions seen at the cinema, reportages on the author, images multiplied of his/her portrait, caricatures" (Hamon, 2008, p. 64). In this sense, the image is not only what is perceived through sight, but also through all the other senses (kinaesthetic, auditory, tactile, olfactory, taste). There are indeed different ways of perceiving information.

In this perspective, "the rationales of aggregation and reticularity have allowed for the realisation of artefacts that are ever-more eclectic and spurious" that "make more fluid and continuous the passage from direct experience, to its possible and multiple iconic-symbolic representations, in which the presence of icons, indices and symbols changes

almost seamlessly, present in successive representations of the same concept, or in the same representation contemporaneously" (Rossi, 2017, p. 15). The introduction of iconic/visual artefacts of a digital nature has made the mediation increasingly recursive and blended, back and forth from the experience to the symbolic conceptualisation, In fact, the digital, by modifying the relationship between experience and conceptualisation, has introduced a new typology of technological mediators, the synthetic mediators, "whose characterising elements are the co-presence of various media and the interaction between the different languages in the single artefact […] that is the aggregation, the interaction of different functions within the artifact thanks to the numeric" (Rossi, 2016, p. 17). The transversally of these mediators "that has in particular to do with their multimediality […], with the convergence to the digital that makes possible the integration of several languages (graphic-verbal, iconic, …) in a single platform thanks to the codification of these same languages" (Rossi, 2016, p. 17). This form of aggregation leads to the realisation of digital artefacts characterised by a fluid relationship between iconic, symbolic and analogic that makes them difficult to distinguish (Galliani, 2014; Panciroli & Macauda, 2019). In that they are fluid, these mediators escape the traditional classification and contain on their inside different languages that re-sematicize the contents in a different way, overlapping different plans of metaphorization (Pentucci, 2017).

VISUAL LEARNING THROUGH AUGMENTED REALITY

Within the scope of the synthetic mediators, an increasingly important place is occupied by the digital artefacts of a visual nature produced through the augmented reality technologies. Under the umbrella term 'augmented reality' we can group together all those technologies of digital graphics (Ferraro, 2014; Borrelli, 2018) that allow us to visualise virtual con-

tents superimposed upon images of objects of the real world. In fact, framing a given environment through the camera of a smartphone or a tablet or by means of a specific visor, a system of the recognition of the images of reference, the so-called markers, is followed by the visualisation of new and different media contents (texts, images, video, audio, 3D animation). The objects that lie in the real world are augmented by the perceptive information generated by the computer, through multiple sensorial modalities. "The superimposed sensorial information can be constructive (that is, additive to the natural environment) and are perfectly interwoven with the physical world in such a way as to be perceived as an immersive aspect of the real environment" (Salvetti & Bertagni, 2019, p. 243).

In this sense, augmented reality renders an image enriched by new information/graphic re-elaborations that are presented in the observer's visual field. A tracking system allows the latter to orient itself and to move within the real environment, having an actual perception of the space that changes depending on the movement. A specificity of the augmented reality is given by the new conception of the space inside which the user moves. if the virtual reality technologies are capable of moving us in other spaces and contexts that separate us from the place where we are and from what surrounds us, the augmented reality technologies, through web-devices and geo-tracking systems, are radically inserted in the place and in the context in which we find ourselves (Borrelli, 2018). In regard to the integration/superimposing of virtual/real spaces, there are however different levels of immersivity: we move from the lightly augmented, accessible via the use of smartphone and tablet to the heavily augmented, accessible through wearable devices such as helmets, visors and smart glasses (Salvetti & Bertagni, 2019). This passage accompanies a progressive disappearance of the interface, to the advantage of a more accentuated immersive sensation. "The graphic interface the computer has accustomed us to is substituted by an interface that pretends to be natural, where the interaction through the touch, the

gestures, operations like closing and widening one's fingers, ultimately lead to the illusion of having to do with things 'directly'" (Ferraro, 2014, p. 59).

On the cognitive level, the coexistence of physical and digital objects allows us to add and diffuse further informational elements with respect to the ones already visible to have the user interact better with the actual environment. In fact, one of the aspects that most of all characterise the augmented reality is the overlay, that is the activation of an additional level of communication: a perceptive level is superimposed by other strata and levels of perception and information. The user "rapidly obtains more circumstantial information and can use them in his/her communicative interaction with other people" (Barbieri, 2020, p. 201). An aspect that seems particularly significant when the interaction with the world results to be finalised, directed or in Heideggerian terms, projected. The augmented reality images thus act upon the cognitive grasping of the environment by the subject and produce a redefinition of the informational space, as well as a redefinition of the limits of one's own possibilities to act in the world. The user or perceiving subject becomes, through the mobile device or the visor, the point of transit of a dual information flow, one coming from the 'natural' world, the other from the 'virtual' one (Finocchi, 2018). In that sense, augmented reality alters the continuous perception of the actual environment and produces an alienating effect, "a sense of greater distance in respect to the things that end up appearing continuously filtered via the information that is supplied" (Barbieri, 2020, p. 202).

Whilst taking account of these aspects, the experiences conducted in augmented reality environments show how the interaction with the real world turn out to be enriched on the socio-relational and the emotional side, offering original pathways for access and novel spaces for the construction of new forms of knowledge. Specifically, recent studies and didactic experiments (Bini, 2017; Diegmann, Schmidt-Kraepelin, Van Den Eynden & Basten, 2015; FitzGerald, Fergu-

son, Adams, Gaved, Mor & Thomas, 2013; Gabbari, Gagliardi, Gaetano, & Sacchi, 2017; Macauda, 2019; Miranda & Marzano, 2019; Panciroli & Macauda 2018; Petrucco & Agostini, 2016) have shown how the structuring of a hybrid space, virtual and real, supports the learning processes by valorising the visuo-spatial intelligence of the learners. In particular, it is recognised how the AR environments developed via the techniques of visual storytelling:

- enable the learners to interact directly with the objects, to explore the mechanisms of the physical world and to experience them directly, fostering an authentic and situated learning of a practical nature; the students practice in managing realistic situations, rather than learning facts or techniques out of context (Khanna, 2014);

- facilitate the learning of complex and abstract concepts, because one tends to remember better what one sees as compared with what one hears; the visualisation of the information allows the students to understand better and quickly;

- provide a thorough understanding, via the acquisition of visual information;

- develop effectively the mnemic capacities of the students who recall the information more easily;

- stimulate critical thinking and problem-solving, allowing one to analyse the situations from different points of view;

- develop socio-relational competencies that improve the interaction and the cooperation between students inside the work groups;

- support the students' research process, increasing the attention threshold, developing and stimulating their creative capacities.

Augmented reality thus acts on the process of learning at several levels, at times positioning itself as environment capable of amplifying and enriching the experience, at others as an instrument capable of providing the directives necessary to reach the pre-set objectives. Augmented reality can be considered as one of the technologies that most of all impacts the learning processes through the use/construction

of digital knowledge artefacts of a visual nature that transform static expositions into virtual panoramas or rales rich in emotional resonances. These new forms of user experiences make available great quantities of new data, local and delocalised at the same time, which transform the physical spaces into multidimensional realities framing objects/documents within narrative and emotional contexts that enrich the user's experience (Brunelli, 2017; Luigini & Panciroli 2018; Panciroli, Macauda, & Corazza, 2019). Thus, new experiential models are defined that help to create new meaning flows in reference to space, time and subjectivity. The augmented reality is characterised by a continuous shifting between of different discourse universes (visual, textual, audio) that determine new meaning relations between the subject and the reality, accelerating some processes, but slowing down others. Notwithstanding the possible potentials encountered, it is still pointed out that an AR system, akin to a fixed image system, could determine the overload and the cognitive dispersion if not adequately reinforced by a direct experience with the objects of the world and by reflexive and abstract moments supporting an efficacious cognitive experience (Bonaiuti, Calvani, Menichetti & Vivanet, 2017; Miranda & Marzano, 2019). The didactic mediation is thus materialised in a continuous transformation between different mediators: from the real direct experience to the augmented experience seen through the screen of a device; from the physical object of the to the image of the re-constructed/re-elaborated object; from the textual document to the multimedia text (Rossi, 2017). The visual environments of augmented reality indeed act as dense and stimulating mediators capable of offering immersive experiences and bringing together styles proper to other media (Bolter & Grusin 1999; Rivoltella & Rossi, 2019; Salvetti & Bertagni, 2018) through the superimposition of different languages, methods of use, habits of use and relational methods (Borrelli, 2018). Thus, reference is made to a process of re-functionalisation, characterised by the creative use of the functionalities envisaged by the digi-

tal environments (Ferraro, 2014). The latter are aligned with the plasticity of multimodal learning styles in the approach to information channelled in a multiple manner, and activate a holistic process of co-construction of meanings and the redefinition of spaces of action/interaction of the subjects, thereby involving complex cognitive and emotional elements.

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IMAGE AND IMAGINATION
A RESEARCH PATH BETWEEN CROSS-SECTIONS AND ETCHINGS

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CROSS-SECTION
ETCHING
GROUND
IMAGINARY LANDSCAPES

Since the second half of the 19th century, the evolution of culture produced an increasing fragmentation and specialization of knowledge that had essential effects also on architecture. As well as other effects, the birth of several specialisms led to a more strong necessity of distinction between the 'artistic' ways of drawing and a more technical and scientific approach, proper of the architecture discipline. More, in general, this process was simultaneous to the separation between the Academies and the newborn Schools of Architecture. A phenomenon that has subsequently distanced architects from the knowledge of a world of materials and techniques become increasingly distant from the universe of architectural representation. This lack of cultural contamination between forms, techniques and languages produced a reduction of the ways to express imagination, limiting the means to amplify the narrative space of the drawing. As a consequence, in the more recent panorama of architectural design, the opportunities for some impartial, hybrid and highly critical narrations become extraordinarily rarefied, as the individual expression of few outstanding protagonists. Starting from this analysis, the research assumes as experimental field one iconographic model: the cross-section, and one technical space: the etching. These two components become themes for building a theoretical framework and realize practical experience. The result is a going on work consisting of a series of etchings reassuming the desire to describe, in a way suspended between reality and fiction, the complex interaction between humanity, soil and environment.

INTRODUCTION

The year 1959 was marked by the publication of "the two cultures and the scientific revolution" by Charles Percy Snow, a brief and vibrant pamphlet, that opened an intense debate on the already evident irreconcilability between scientific and humanistic culture. Without entering the book's merits and defects, as well as its effect on the cultural debate, it is interesting underlining how the text established a significant threshold in a complex cultural transition, whose effects are extremely relevant also compared to the discipline of architecture.

As a matter of fact in the art of designing and building it can be underlined a progressive and incremental separation between humanities and hard sciences to which corresponded changes in teaching methods, the invention of new professional figures, and the emergence of specialised actors in the variety of fields of a more and more sectored knowledge.

This process was quite slow and assumed an established problematic identity right at the moment when Snow has revealed the impossibility of conciliation and the profound different attitude of the two forms of culture in dealing with the reality.

In architecture, it can be identified at least one crucial moment of fragmentation that started highlighting the conflict between the humanistic and the scientific side of the discipline. Thinking the traditional unity of painting, sculpture and architecture, whose communion has characterised several centuries of artistic experience, it cannot forget another form of relationship between architecture, technology and science. Since Vitruvius, the knowledge of the architects passed through expert training in construction, hydrology, geology and other fields of expertise. For this reason, until the end of the 18th century, it did not exist a precise distinction between disciplines, whose independence consolidated with the invention of modern engineering and the birth of polytechnic culture and polytechnic universities (Picon, 2006). As a result, after this moment, architecture also felt the need to progressively

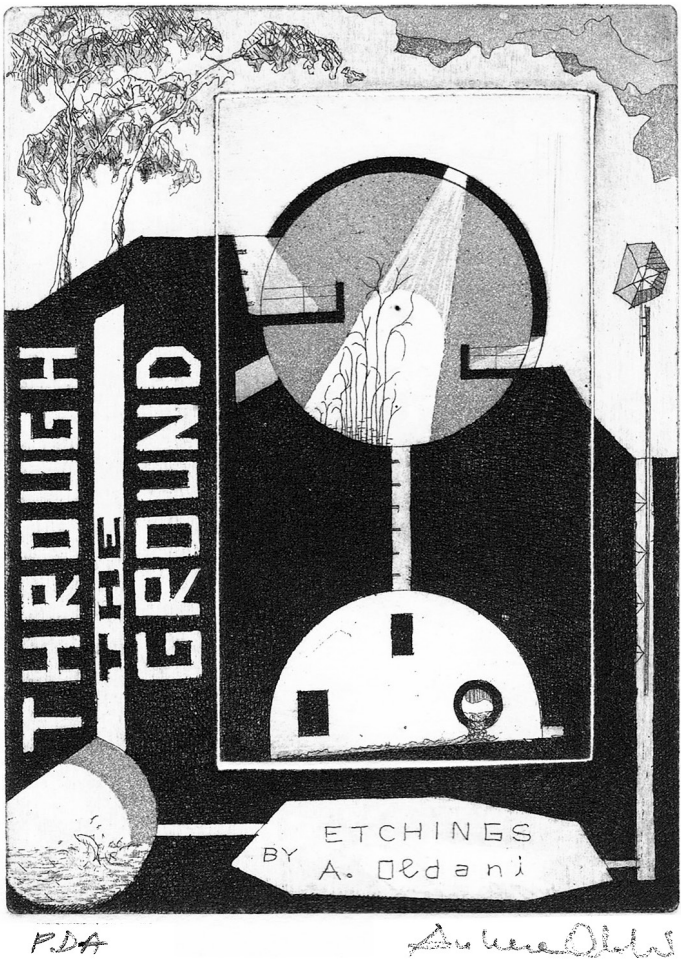


Fig. 1 Andrea Oldani, *Through the ground*, 2019. Composite frontespice, two plates, cm. 8,85 x 11,9. Etching/Acquatint.

detach itself from the broader field of liberal arts, founding a new institute for building a new generation of architects, whose goal was offering a balanced blend of art and science. For this reason, the traditional way of training architects has started to change rapidly in all of the more developed countries (Gabetti, 1986), meeting at least two genuinely significant thresholds of change in Italy. The first occurred in the first decades of the twentieth century, the second coinciding with the Seventies.

One of the most compelling evidence of this mutation is related to architectural drawing. The rethinking of an architect's

ability to respond to the reality of construction has produced a remarkable mutation of the methods, the form and the idea of representation, starting from the training, less directed to challenge individuality and talent, conversely focusing on transmitting the need for clarity, uniformity and precision in the technical description.

One demonstration of the first phase of this process is summed up by the comparison between the training, the ability and the use of the drawing by some masters of Italian architecture. One study, based on the confrontation between the experience of Portaluppi, Michelucci and Ridolfi, highlights the degree of skills acquired during higher education, the type of teaching received at university and the ways of using drawing in the profession. It emerges how, after the institution of the *Scuole Superiori di Architettura*, the university training had tended to homologate individual talents and standardise knowledge patterns, with disinterest for classical training in drawing expertise; aspect considered as the prerogative of few virtuosos, not necessary in the statute of the new architect (Conforti & Dulio, 2005, p. 82). This separation intensified again after the university protests of 1968 with the abandonment of the traditional way of teaching life drawing, whose mastery started being considered "by critics and innovators as useless and superfluous calligraphy" (Portaluppi, 1962, p. 5). Of course, those two passages included the abandonment and the ignorance of a set of techniques (like etching and printmaking) fundamental in the artistic discourse, but secondary or insignificant in the new field of architectural drawing.

With this in mind, it is possible understanding the progressive consolidation of a distinction between artistic and technical, architectural, or engineering drawing; where the different adjectives seem always separating more and more irreconcilable messages and domains.

Also, for this reason, moving towards a technical statute of representation has progressively obfuscated another world whose scope can be understood through two or more oppositional couples like reason and feeling; rationality and

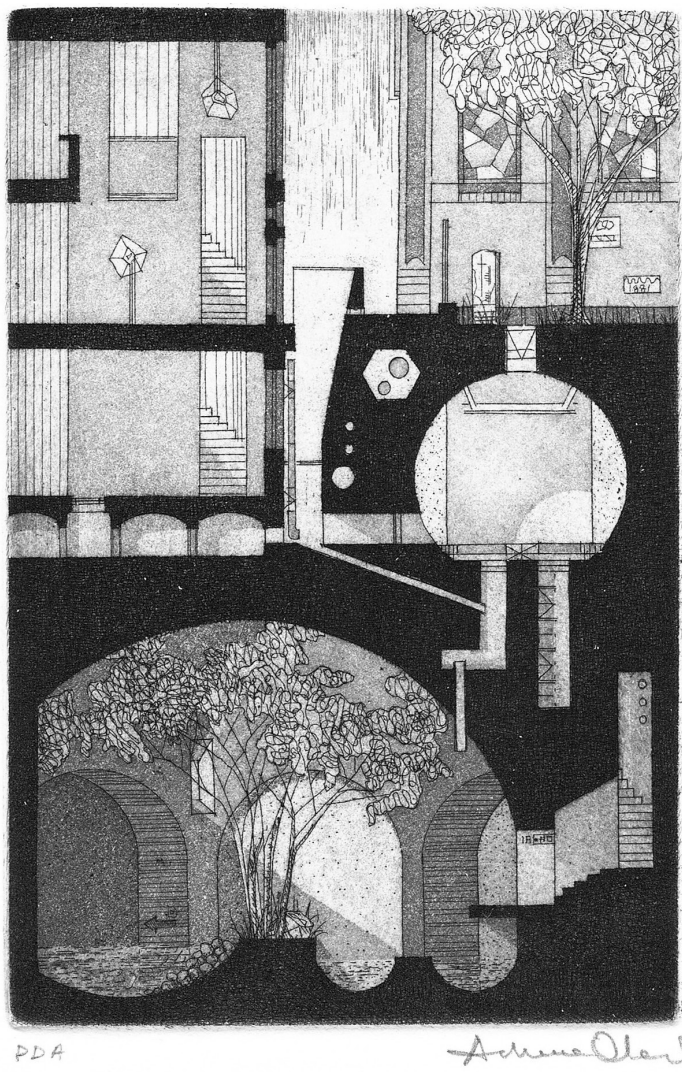


Fig. 2 Andrea Oldani, *Il greto nascosto*, 2019. Plate: cm. 9,8 x 14,8. Etching/Acquatint. This work is combined with a text published by Edizioni dell'Angelo in the series of plaquettes *Architettura Incisa*.

irrationality; reality or fiction. Despite this, some fragments of this space for "invention" still exist in the perennial, continuous oscillation of the architectural drawing between two attitudes, one "mimetic" and one "poietical"; where the second one, related to a designing projection, implies separation in terms of space and time with the present reality (Ugo, 1994, p. 13) and opens to something unexpected. This feature also justifies why "drawing can take an autonomous value in architecture" presenting itself as a reaction to various conditions among which Vittorio Gregotti (2014, p. 16) underlines

five primary examples. In the first the drawing is configured as "an affirmation of divergence of principles concerning current professional activities"; in the second it appears as "willingness to propose something authentically autonomous: personal expression, a fragment of dream, memory, illusions or truth"; in the third case it can be intended "as a manifesto of one's position about the artistic practice of architecture", or as forth, the "representation of an idea of social utopia"; and finally, "more simply as a project not realised with high ideal content, a sublime image of a foundation that remains unknown for its realisation". In this limited, autonomous field of action they remain the traces of a past in which techniques, gestures and signs became the expression of a way of understanding architecture that has increasingly vanished within a tight codification and a desire to emancipate a pure technical use from the variety of forms of drawing.

On the other hand it is evident how a genuinely unrestricted approach to drawing has somehow been a problem for many architects, especially during training. Aldo Rossi, for example, was harshly criticised during his studies for his approach to drawing (Rossi, 1981, p. 39), although this way of drawing later became one of the most authentic expressions of his way of thinking. However, despite an extreme coherence in his work, it is an evident separation between the poetry that shines through in his 'artistic' drawings and the rationality that distinguishes the technical drawings, up to find in the printmaking techniques an ideal "reflexive medium, rather disconnected from everyday affairs" (Quik, 2015, p. 42).

These windows of freedom and expressive use of drawing also led to a remarkable season based on the centrality of drawing. Both in Italy, as 'drawn architecture', and in Russia, as 'paper architecture', simple architectural drawings, far from the hypothesis of construction, become an attempt to answer to a critical condition for architecture, starting being a reflexive tool and discursive space for the elaboration of theories. This attitude found later a new obstacle. In fact, towards the end of the last century, the progress and the diffusion of personal computers, brought to a new hegemony of digital drawing, with a constant loss of manual and

graphic expression skills, especially in the architects of the last generations.

Also, for this reason, today, it is necessary "focus once again on the great tradition of imaginary and analytical drawings, in which the sensibility of the execution, ad the feelings inspired in the draughtsman by the subject-matter, imbue these drawing with matchless expressivity and in some cases particularly noteworthy levels of artistic excellence –even if they cannot always be defined as works of art" (Docci, 2014, p. 5).

In other words, this is an invitation to reconsider the value of some artistic techniques in comparison to more lawful use of architectural drawing in order to explore the limits of the narrative possibilities of representation, introducing the opportunity of a renewed reflection on its potential in the field of imagination and images production.

MATERIALS, METHODS AND RESULTS

What shown above supported the intention to develop research interpreting the threshold and exploring the limit existing between the modes of artistic representation and those of technical drawing. This aim consisted of identifying a theoretical and technical space, for some experiments to verify the possibilities of reconciliation between two conflicting instances. Activity that consists of exploring fields where representing some fragments of imagination, albeit within a reflection that adheres to precise a disciplinary discourse on architecture.

Given these points, the reflection assumed as central points of experimentation one iconographic model: the cross-section and one technique: the etching. The first, it is inscribed and limited to the technical sphere of drawing. The second, it is representative of a field of invention and interdisciplinary dialogue that has always been significant in the imaginary of artists and architects.

Behind the conceptual simplicity of the cross-section representation, which consists of the two-dimensional

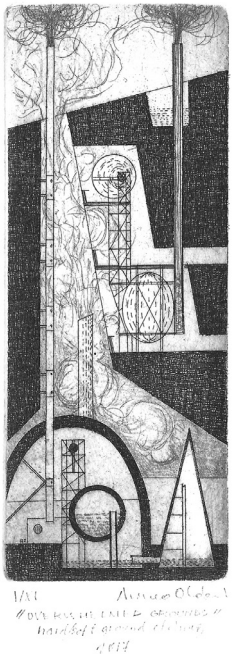


Fig. 3 Andrea Oldani, *Overwhelmed Grounds*, 2017. Plate: cm. 5 x 13. Etching/Soft Ground This work has been realized for *Printcard Wrocław*, exhibition topic: Beyond Control.

visualisation of the intersection of on object in three-dimensional space with a plane, lies an intriguing form of drawing that allows exploring the invisible.

The cross-section, as a mode of the orthogonal projection, is a scientific way to operate a descriptive "detachment" from the idea of "view" through the exclusive choice of one form of analytical multiplication of the image. It operates restitution of data that are "invisible" even if "explicit", offering a limited possibility of "indulging in figurative mimesis", although guaranteeing a high possibility of "structural mimesis" (Ugo, 1994, pp. 100-104). These characteristics make the cross-section capable of "particularising" instead of "generalising", allowing to stress "synthetically and synchronously" the "relationship between the ground, the interior of buildings and the atmospheric cavities" (Purini, 1992, p. 78). Even so, such possibilities, that make this valuable tool support in architecture, for description, interpretation and design, do not find critical responses outside the mere field of technical representation. The power of the vertical cross-section as a narrative medium should be discussed at least with respect to one limit and one potential. The first depends on the limited availability of descriptive space that is offered between the cutting plane and the background; where it is necessary refining the contents in order to avoid overlaps and confusion. This critical distance is, however, compensated by an extending possibility, which consists in the use of the combination between the section and other forms of representation such as axonometric projections and perspective. The second lies in the unique ability of the section to penetrate the reality, showing the unexpected. The "cut" reveals what the eyes cannot see. In this property resides an underestimated narrative value.

However, despite these arguments that make the cross-section a somewhat narrative space, there are very few and contradictory traces of the use of this mode of representation outside the field of technical drawing. Signs of fiction and narrative fantasy can be found, for example, in the cross-sections drawn by the visionary architect Jean-Jacques Lequeu, whose experience in geometry was joined to a deep

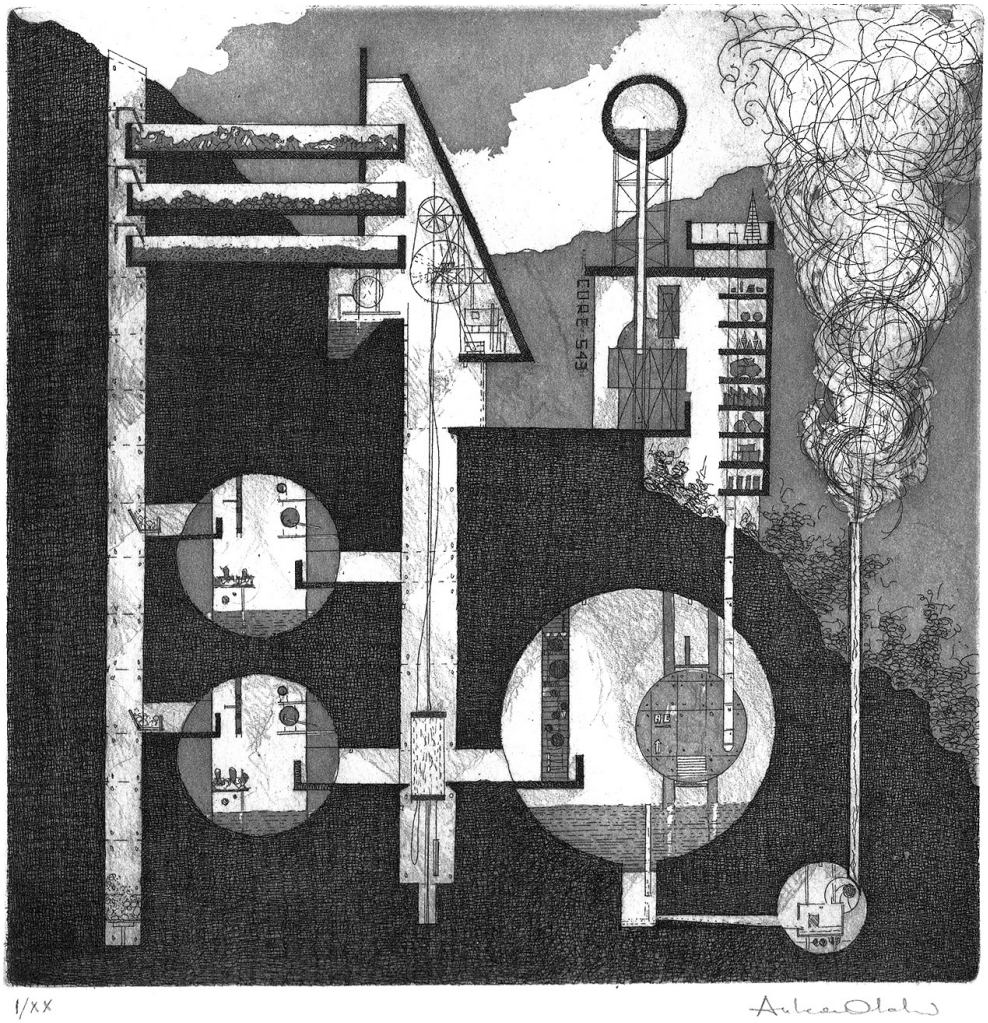


Fig. 4 Andrea Oldani, *«Core 543» an hypothetical groundscape*, 2017. Plate: cm. 17,5 x 17,7. Etching/Soft Ground/ Acquatint.

curiosity, that led him to a parallel research path, marked by a purely artistic nature (Baridon et al., 2019; Boeri, 2019). Spatial and typological inventions not far from that of the *éléphant triumphal* by Charles-François Ribart, world-famous *architecture singulière* whose celebrity is undoubtedly due to the cross-section's ability to reveal the inner nature of a giant sculpture or habitable architecture (Martin, 2019).

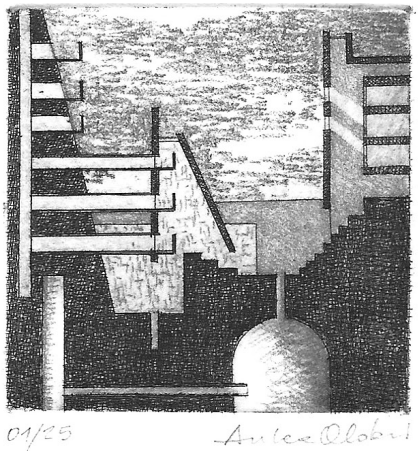
Undoubtedly such kind of experiences, coming from a visionary generation of French architects, deep influenced a later group of critical thinkers who used the vertical cross-section as a way to explore utopia. One example can be the

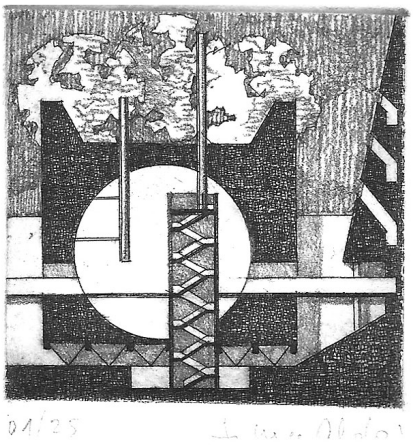
atomic underground city presented in 1969 on the pages of *Esquire* by the architect, city planner and professor Oscar Newman (Harmon, 2016, p. 57). The science-fiction concept originates as a design response to the real effects of an atomic test that produced "a perfect hollow sphere, a half-mile in diameter, five hundred feet below the surface of the earth" (Newman, 1969, p. 186). It is a radical vision represented through a cross-section, the only possible way to scrutinise the dark dimension of the subsoil, emphasised by the use of colours tending to blue and brownish-red.

In the same way, it is impressive exploring the work of Alexander Brodsky and Ilya Utkin, whose composite plates commenting "on the discrepancy between political propaganda's false promise of social utopia and the hard facts of a disappointing reality" (Nesbitt, 2015, p. 19) use all forms of architectural representation, including the cross-section, as a way to communicate the discomfort of an unsustainable political condition. Intent shared with a vast community of "paper architecture's" builders (Klotz, 1988) who contributed to move the use of architectural drawing towards the maximum expression of its narrative potential.

The work of Brodsky and Utkin establish a fundamental connection in our research. Their work is based on the use of etching as the principal means of expression, production and reproduction of their visionary architectures. This is only one of many compelling evidences of how the etching constitutes a privileged field of invention, capable of fostering the transition between the two similar but separate universes mentioned at the beginning of this paper.

The universe of printmaking, in which etching is predominant, constitutes a heterogeneous field of experimentation; in which the art of drawing is blended with alchemy; the languages of drawing with the pictorial ones, and those of graphics. This process demonstrates, better than other fields, how the "artistic practices have an extraordinary relationship with techniques as materials able to define the intentions as well as working as design tools" (Gregotti, 2002, p. 77). For this reason, the process of etching, first of all, corresponds to a "rigorous mental project", where lies





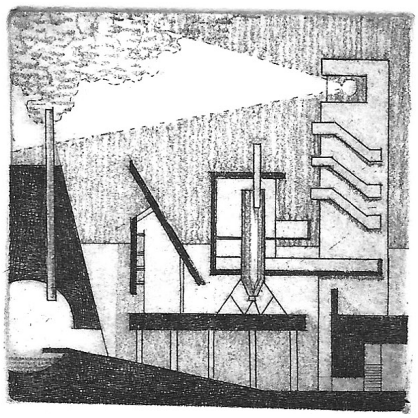


Fig. 5 Andrea Oldani, *All through the ground*, 2017. Three plates: inch. 2 x 2. Etching/Soft Ground These works has been selected for the *11th Biennial International Miniature Print Exhibition 2017* - Center for Contemporary Printmaking, Norwalk, CT, U.S.A.

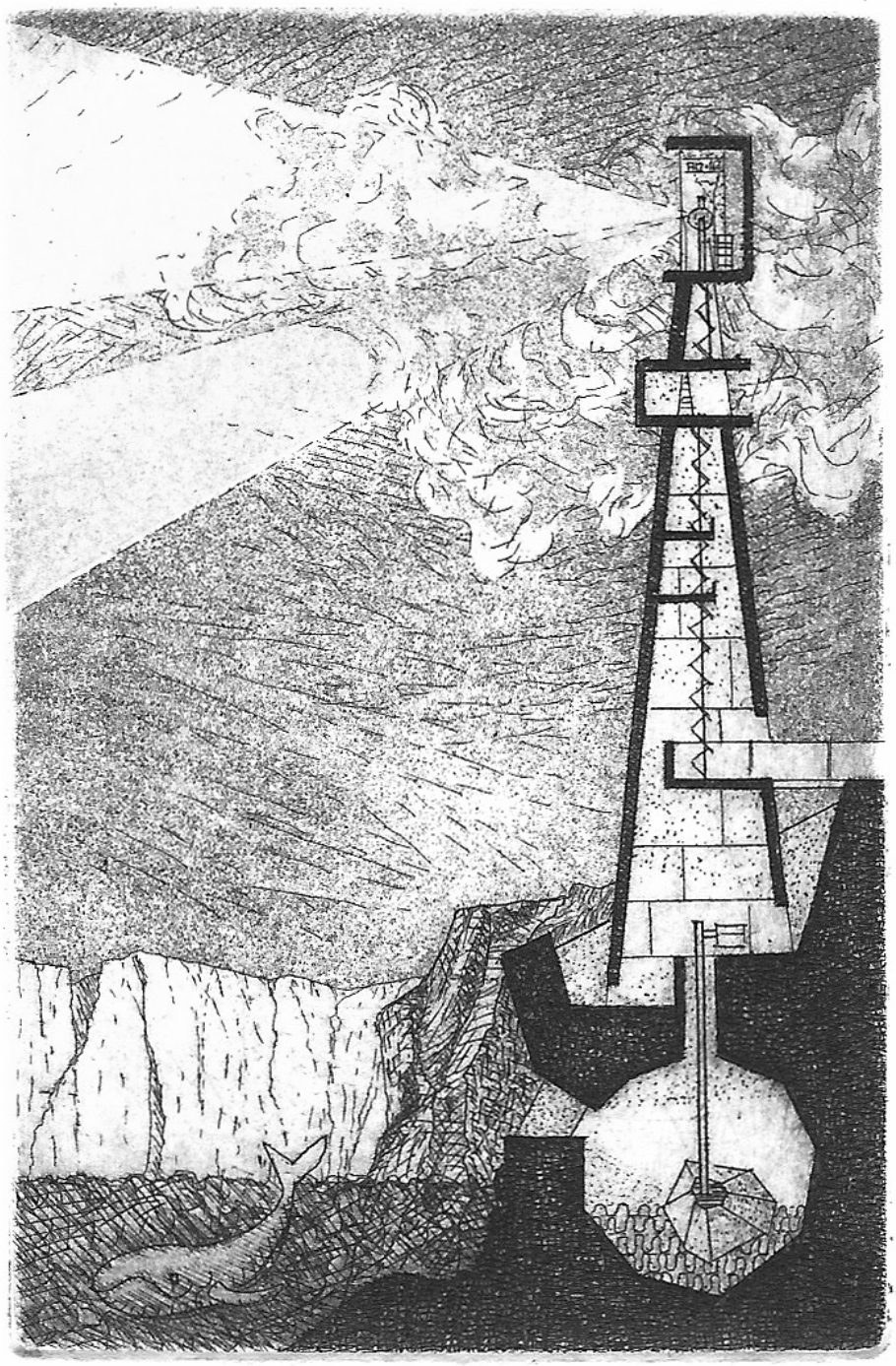
two aims: a "design intentionality", and the "elements of a plot and a story" (Moschini, 2009, p. 26). There is, therefore, a form of "anachronism" in the etching that enriches it with "paradoxical modernity". This is overall "expressed in a slow temporality of thought and gesture that, for an architect, is a countermeasure of undoubted effectiveness to the frenetic rhythm that today consumes the language and the exercise of building" (Purini, 2009, p. 20). Etchings highlight how "anything we can express, it is already included in the gesture and the sign deriving from it". It makes those expressions visible, as "necessary results of our way of being, suspended between rationality and irrationality" (Strazza, 1979, p. 13).

As a matter of fact, since history, etching has always been a space of retreat for some architects trained, or supported, in dealing with its language and technique. Without involving Piranesi, whose role in etching is extraordinary and far from standard practice, there are many significant examples even close to us of architects committed in printmaking. Designers and scholars who have built a complementary or parallel narration to works produced in the more conventional disciplinary areas.

Going back to the first generation whose architectural training was emancipated from art schools, in the Milanese context, they can be distinguished figures like Paolo Mezzanotte (Bellini, 1992, p. 118) or Giovanni Greppi (Calzini, 1932, p. XIX). They were both famous architects, who dedicated themselves to the art of etching with intensity, taking part in prestigious competitions and artistic events. Equally important it is the experience of another generation, not driven towards the printmaking techniques by the influence of the traditional academic culture, but by the research of an alternative space for the construction of architectural theories. It is the case of Aldo Rossi (Celant et Huijts, 2015), who, introduced to the potentialities of the etching by another protagonist of printmaking, Arduino Cantàfora, started experimenting by himself this powerful media, fascinated by "a world, perhaps lost of technique, that beyond acquisition, becomes protest" (Rossi, 1988, p. 7).

Under those circumstances, it becomes possible agreeing that "etchings are not done to imitate and reproduce qualities

Fig. 6 Andrea Oldani, *The Giant and the Wale*, 2018. Two colours plates: cm. 5,8 x 8,8 . Etching/Acquatint These works has been exhibited at the *I Mini Print Biennial, the Sea and the Lighthouses* at *Faro Cabo Mayor Art Center*, Santander, Spain.



AP I/III

of other techniques, but to obtain something new and express particular ways of creativity. The severe limitation of means, together with the need to measure oneself, consciously, with matter and time, are the basis of their analytical and synthetic character" (Strazza, 1979, p. 75). For this reason, several generations of architects found in this technique space for analysis, synthesis, narration, fiction and elaboration of self-knowledge.

A discreet knowledge and practice of the etching technique, together with interest in the critical topics previously addressed, as well as the availability of a project, were the reasons that lead undertaking personal research based on the use of this media.

A consolidated interest in the ground intended as space, infrastructure, support and discursive place in the history of the modification of our planet (Secchi, 1986), as well as the risk of definitively compromising this delicate environmental infrastructure (Pavia, 2019) has led to the assumption of this subject as a theme of exploration.

The use of etching offered the critical space for a narrative exploration, aimed at the exasperation of a plausible plot, suspending the discourse between reality and fiction, without renouncing to denounce the most destructive attitudes operated by the contemporaneity. As a result, the vertical-cross section has become the indispensable tool for the exploration of the invisible reality that lies beneath our feet. These three elements become the themes around which has been carried out a going-on work, which is testing the narrative capacity of an exquisitely technical form of representation, the critical space of etching and the desire to explore invisible landscapes.

DISCUSSION AND CONCLUSIONS

What emerges is a series of etchings showing a sublimated reality of the world that hides below the line between earth and sky. The desire to exasperate the modes of the most violent interaction between humanity, earth's surface and subsoil is emphasised by the possibilities allowed by this

technical mean. The contrast between the deepest black and the lightest white symbolises the deepness of the earth and the mysteries of its cavities. The landscape is dominated by silence, broken by the buzzing of mysterious machines and the movement of dense fumes. Water dominates the underground dimension like an ancestral fluid that humanity has not yet adequately controlled.

The collection returns vast imaginative possibilities despite the limited narrative space offered by the section.

Since this is personal research, I do not think that the intention should be to find some conclusions, instead I think it is correct to offer these theoretical, critical and imaginative materials as topics for a constructive debate. The aim is also recovering a form of a dialogue between a technical dimension of drawing and the expressive possibilities that derive from the knowledge of artistic techniques, a preferential field for the exploration of the subjects of image and imagination.

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THE NEW BOUNDARIES LIKE EXILE OF CONSCIENCE

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ESSAY 38/02

INFOGRAPHIC
GRAPHIC DESIGN
BOUNDARIES
GEOGRAPHY
DIAGRAM

Keeping wondering about the value of the military barriers built with defensive purposes, we continue our study reaching the present day. This time, the attempt to transpose graphically a phenomenon that is difficult to perceive because of its dimensional and social magnitude prompted us to use as the interpretation key the comparison between two great defence works, belonging to the same kind: the continuous wall system.

The *Great Wall* of China and the *Tijuana Wall* are two experiences that may appear similar, but they are culturally and temporally distant. This essay analyses them aiming to generate a tool for understanding the phenomenon of building spaces. In order to do this, the graphic synthesis process becomes the place for thinking about the ideological contents and the social involvements that are intrinsic in every single barrier built.

INTRODUCTION

This work is an in-depth analysis of the former one, titled *Limes et confinis* (Pastore, Sisci 2019). Together, they constitute an attempt to build a graphic model able to interpret the mind perception of the space limits and lead to an objective view of them.

In *Limes et confinis* the attention was focused on 23 works made with the objective of defence, starting from the Roman Empire age until the post-II World War. The aim was to build a visual cognition of objects –in some way make them visible– which for their territorial extension and temporal distance from the present times, have lost the value of elements capable of building space.

In this essay, we consider walls with defence purposes built in the period starting from the fall of the Berlin Wall until today, trying to analyse the visual and perceptive implications of these 'new boundaries'. Effectively, the objective, remains the same for the two papers, a part for the temporal distance of the buildings considered. The first important step of research is to observe the fact that peculiar phenomenon keep developing independently from the civilizations that generated them and still keep eluding the visual and mental perception of those who try to understand them.

Having to represent objects that are impossible to experience completely, it was necessary to identify a unitary criterion for their observation. A first analysis led us to observe the low architecture value of these barriers: the construction systems range from a simple barbwire to reinforced concrete prefabricated elements. For this reason, besides focusing on the immaterial peculiarities more than the material ones, it has been chosen to structure a comparative process in order to achieve a representation based more on their ideological meanings rather than the morphological one.

THE IDEOLOGY OF SECURITY

The urban walls –or fortification walls in detached provinces– are traditionally intended as devices to safeguard and to bound territories. Whether it was a small State or a big Empire, the making of bastions, towers and walls had multiple functions: to intimidate the enemies (preventing them from invading); to consolidate borders and celebrate conquests, obtaining in this way outposts in far lands; to promote propaganda which the political class would use to give the people a sensation of strength and safety; to create a civil harmony excluding the threat of the 'outside', empowering the idea of the 'inside' . Between all of them, the latter is the one that kept being the main elements promoting the building of military works of this kind.

We can say that even today the presence of walls is mainly due to similar strategies, based on the will of making a symbol of political strength, at the same time satisfying the need for protection.

The first reason supporting walls is the construction of an ideology of safety. This is confirmed by the fact that some of these expensive and anachronistic works don't even follow the actual State borders and they cannot be considered genuine fiscal signs to mark territories. For example, the wall that divides the city of Belfast into the Catholic and Protestant zones is a 'boundary within a boundary': one is the physical border of the political organisation –the national border–, the other is cultural and religious boundary to clearly distinct from 'the different' –inside the same city.

Therefore, the focus shall be, the dialectics between the inseparable hendiadys space-power and the binary concept friend/enemy intrinsic of the thanatopolitics. Such dialectics identifies in the border not only a peripheral and defining element of a population but also the non-place within where this dialectic happen (Cavalletti, 2005; Augé, 2009).

BACK TO THE FUTURE

Martin Bureau in his art project *Walls of Disorder* (Figure 1), opens with a question his video *Israel and Palestine – They asked nobody*: "And the question is: what do you think when you see the wall?". A statement follows: "They asked nobody. They don't ask anybody. This is military order". Then, a sequence of citizens' testimonies, leads those who listen to see the reality, with few simple words.

Fig. 1 Separation Wall (Israeli) or Apartheid Wall (Arabic), Bethlehem (a) Qalqylia (b). Photos by Martine Bureau.

Acknowledging such questions, this research wants to understand the meanings of the barriers made with anti-migration or segregation purposes, from 1945 to 2016, starting from the *space practice* (Lefebvre, 1974), and reaching a visual/graphical translation that can show the importance of the phenomenon, to eventually make it comprehensible.

Thereby, to keep asking about the various kinds of defensive superstructures and which techniques are used to make them, becomes an important inquiry. The assumptions underpinning the study are firstly the trend of abandoning the practice of building space-time perception models like maps, replaced by acritical and undifferentiated mapping practice for any phenomenon. The other assumptions is the transformation of the social qualities towards an extreme fragmentation.

Therefore, it is not surprising to find out that the current period is the one when the barriers which pretend to defend territorial identities are seeing a remarkable increase in number.

Thirty years after Berlin

The age of the big defensive structures seamed to end with the fall of the Berlin Wall (11/1989), and the decline of the 'Iron Curtain'. In the European territory the freedom of movement, favoured by the globalisation processes, started a period of profound change in which the strict control on the borders clashed with the easiness of crossing them by airplanes.

A crucial event in migration that showed the illusion of a world with no boundaries, was the landing of the Albanian ship *Vlora* at the port of Bari –in southern Italy– on the 8th of August in 1991 (Figure 2). About 20.000 people taking advantage of the opening of their country borders after the downfall of the socialist regime of Enver Hoxha, highjacked a ship docked in Valona to head towards the Italian coast. Later, this episode became a symbol of the global immigration phenomenon.

Fig. 2 The ship *Vlora* on 8th August 1991 morning at the port of Bari.

In 1984 Foucault said "you will understand why the boat has not only been for our civilization, from the sixteenth century until the present, the great instrument of economic development, but has been simultaneously the greatest reserve of the imagination. The ship is the heterotopia par excellence. In civilizations without boats, dreams dry up, espionage takes the place of adventure, and the police take the place of pirates" (Foucault, 1984/2010).

In the genesis process of defensive structures, Imagination is the key element, twice: firstly for those who imagine a different, better future beyond the barriers, then for those who build them, interpreting the difference as a threat to be kept under control. The demonstration of the growth of a need for safety, born after the constitution of fluid geopolitical spaces needing the definition of their new boundaries, is the exponential increase of the barriers built to prevent migrations.

The *Université du Québec à Montréal*'s study (Vallet, 2014) traces the following evolution: 27 years after the fall of the *Berlin Wall*, we went from 16 barriers to 63 ones, disseminated on the whole planet, 2 of which in America (National borders partially or fully fenced-off. The majority of Brazil's proposed barrier comprises a non-physical 'virtual' wall, monitored by drones and satellites), 16 in Europe, 12 in Africa and 36 in Asia. The reasons declared by the governments are: to prevent illegal traffics, contraband, and illegal immigration and to control the territory.

Their presence reveals the self-recognition processes of an individual within today's society, increasingly fragmented. The disintegration of the logics of identification and belonging to a group, seems to have awakened ancestral fears that result in realising methods to control the territory, whose practice is lost in history. This need for safety and safeguard of the good, private and communal at the same time, becomes the bearer of xenophobic feelings which were not so evident in other times of human history.

The *Tijuana Wall* like the *Great Wall*?

"Are you ready? We will build a great wall along the southern border – and Mexico will pay for the wall. One hundred percent. […] On Day One we will being working on an impenetrable, physical, tall, powerful, beautiful, southern border wall. We will use the best technology, including above –and below– ground sensors […] towers, aerial surveillance and manpower to supplement the wall." (Donald J. Trump during a major speech on immigration in Phoenix, Arizona. 31 August 2016).

The *Tijuana Wall* extends on the whole border separating the U.S. from Mexico, but today not all of its 3140 km have been completed (Figure 3). Its building started in the nineties with the proclamation of the *Immigration Reform and Control Act* by President George H. W. Bush and it is a physical monument of American hard-line immigration policy.

This impressive defensive structure recalls the memory of an image that is often compared to it: the *Great Wall* of China (Figure 4). However, their ontological difference is real and to understand it, it is necessary to observe each of these two experiences trying to assume the viewpoint of the time in which they happened. The great defensive works like the *Great Wall* of China or the Roman *limes* can be intended more like zones of exchange and spatial knowledge, than sharp dividing lines of different things (Waldron, 1993).

The huge time gap that separates the *Great Wall* of China and the *Tijuana Wall* allows to make a comparison on different levels, for instance, historical, technical and ideological, to reveal, based on consolidated data (*Great Wall* of China), new data still in the process of development, not yet historicized (*Tijuana Wall*).

The first great difference is the forming process. The *Great Wall* –that goes through a big portion of current China– was born at the will of the Qin Dynasty (221-206 BC) which decided to unify some pre-existing regional fortifications. In the following centuries, other dynasties kept contributing to the construction of what still nowadays can be considered the greatest work of border demarcation in the ancient world. Contrarily, the *Tijuana Wall* has been built just recently, pushed by the apparent requirement of defending the southern American borders from the migration stream of the peoples of the south. Its evolution is therefore quick and totally new. Analogously to the Wall of China, the *Tijuana Wall* is the greatest fortified border of the contemporary world.

Leaving the territory observation and moving to the architectural one (Figure 3c, 3d), it is immediately possible to make a comparison of the constitutive elements. The two

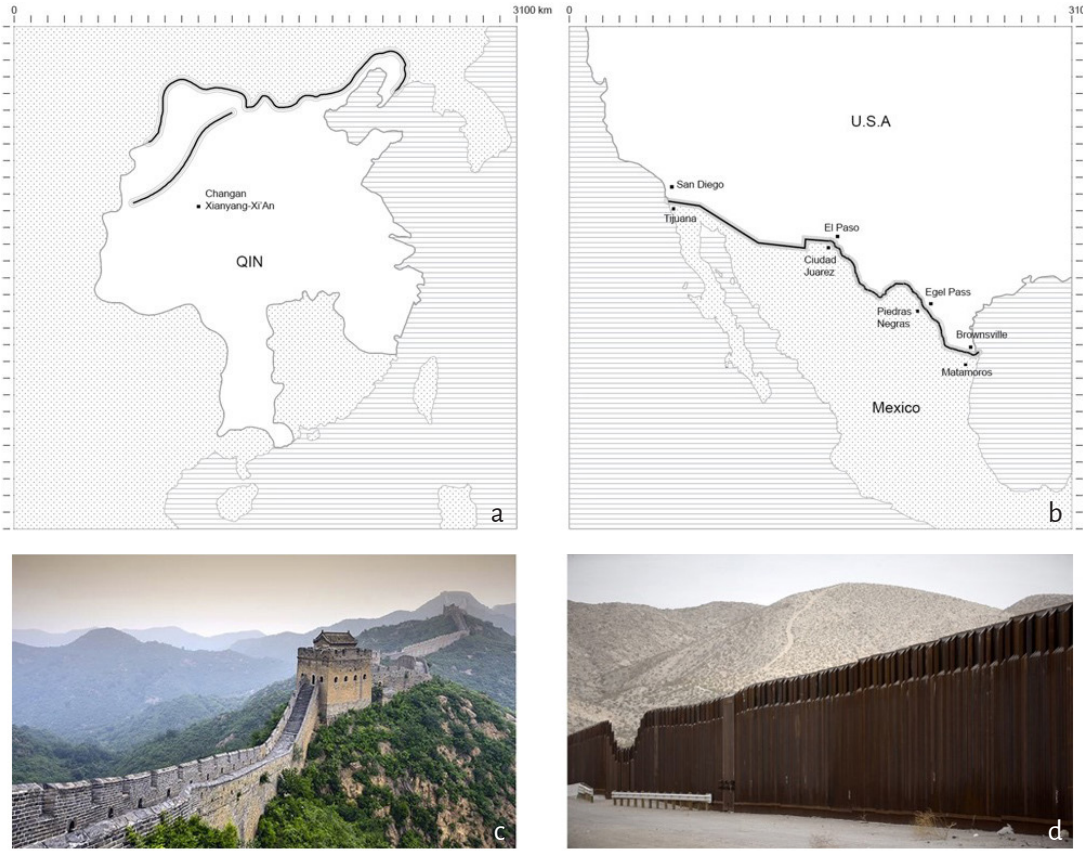


Fig. 3 Map of Qin Dynasty extension 221-206 a.C. (a). USA / Mexico border wall map (b). Building technique: *Great Wall* of China (c). *Tijuana Wall*; photo by Martine Bureau; video project *Wall of Disorder* (d).

walls are both linear, open and continuous, but different in techniques and materials used to build them. The construction method in stone blocks of the *Great Wall* embodies the extraordinary ideological strength that generated it: the mind representation matches the imagination. This unified image, solid and recognisable, is supported by military architectural elements like battlements, embrasures, towers, and forts made in what will be later called Oriental-style, which contributes to characterise the work (Ambrosi, 2015).

The *Tijuana Wall* is as well a work of defence, open and continuous, but the elements that make up it are just prefabricated structures in reinforced concrete or iron. The reiteration of a single module makes up the whole structure. The final walls image separating the USA from Mexico is less imposing, and over-

all it is anonymous as it is not possible to recognize the mental image –draw– that might have generated it.

Now it is necessary a reflection to make evident that the unquestionable recognisability of the *Great Wall* of China is mostly guaranteed by its architectonical characters, and just secondarily by the surrounding landscape (Figure 3c). On the contrary, the *Tijuana Wall* twists and turns continuously identically in changing sceneries: the landscape is, in fact, the only factor that allows us to recognise it from many other similar barriers (Figure 3d). To break the monotony of the sequence of the prefabricated modules come the *Grand Canyon* of Santa Elena and the *Rio Grande* river, in the *Big Bend National Park* in Texas, which define the division between the Mexican land, on the south side of the slopes, from the U.S. territory on the northern side. Just thanks to this view, despite the apparent space continuum, the idea of a difficult barrier to cross takes shape and becomes geographically recognisable (Figure 4c).

That becomes even more evident if the two works are deprived of the context, using a graphic clean representation. In Figure 5b and 5c both the barriers are represented only by their fundamental elements, without the variable which are not able to make any significant difference.

Fig. 4 Geography and walls: *Great Wall* of China(a), *Tijuana Wall* (b). In Texas the Rio Grande River draws the frontier. In *Big Bend*, it's topped with cliffs up to 1960 feet high (c). Photo b and c by Martine Bureau. Video project *Wall of Disorder*.

The clear recognisability of the *Great Wall* of China and the necessity that the *Tijuana Wall* has of the surrounding landscape to be recognised, are both aspects related to external observers. How these walls are related to the surrounding territory, is instead a further level of reading.

Architecture, including the defensive one, has always been an expression and representation of the society that generated it. The construction methods and the defence and control needs are connected to the historical period in which they are built. The will of control and expansion of the Qin dynasty, therefore, led to conceive a defensive system that could be at the same time a place for observation and a place to hide in. This configuration was produced considering the war technologies of the time, which were not still able to make long-distance attacks. The safe viewpoint from which to monitoring the territory, is located 'inside the wall'. Doubling itself, it becomes an inner and continuous connecting path (Figure 5a). The will to control creates an object that presents features of surveillance both dynamic, along the crenelated walls, and static, inside towers fitted with firing positions.

Following once more an equal and opposite analogy, the *Tijuana Wall* does not consider an 'inside', but just following the uninterrupted and imaginary state border, determines the changing position of its point of view (Figure 5c). Rather than guards, even hiding, the monitoring of the southern American border makes use of drones that fly over the zones considered high-risk. Just in some cases, compatibly with the available funds, guards patrol portions of the barrier.

Dematerialising the point of view into a moving and not defined entity, generically placed at a high elevation, transforms this kind of barrier in something else. From a defensive and monitoring system, it becomes an object that embodies the ideology of refusal. This 'new limit' declares the will of demarcation and separation

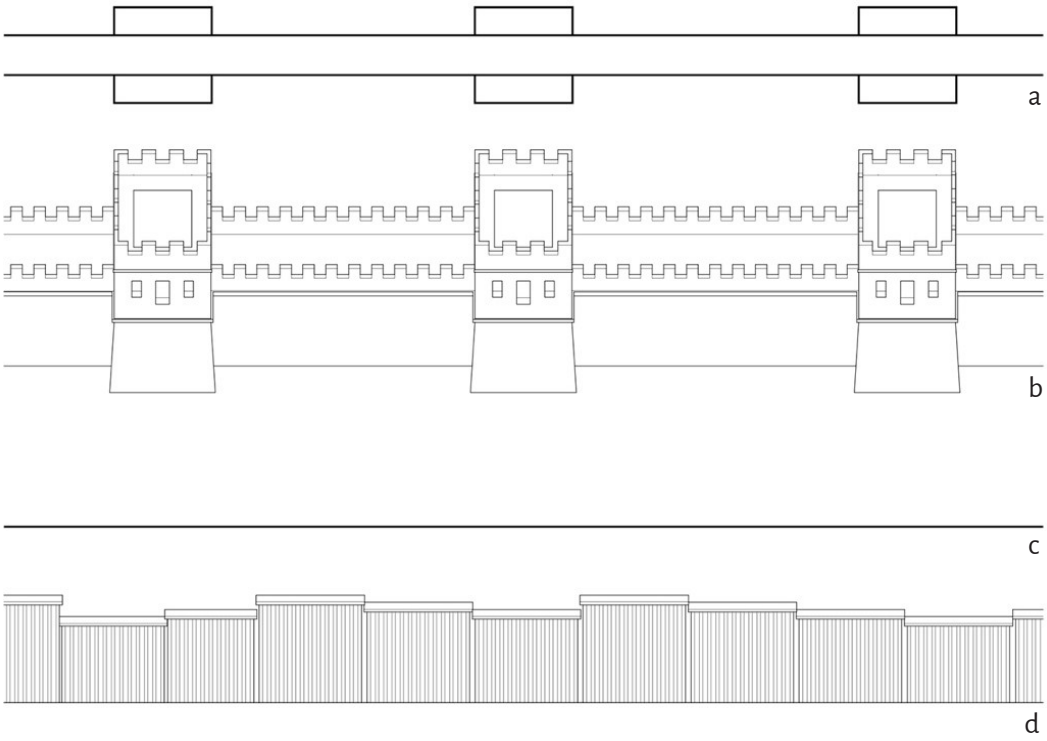


Fig. 5 Planimetric and axonometric diagram of *Great Wall* of China (a) and of *Tijuana Wall* (b).

from who is different. In this regard, an emblematic case is the *Brazilian wall* that not having any physical fence but an imaginary barrier realised exclusively through the usage of drones.

It is eventually easier to associate this wall and all similar constructions, to a further form of punitive ideology and strategy, as presented by Michel Foucault in the famous essay *Surveiller et punir. Naissance de la prison* (1975). These barriers can be intended as further space expression of the identification process of the excluded ones, a method that uses the analytical subdivision of the power to be legitimated (Foucault, 1975).

The new state racism is practiced through the conflict life/death –more precisely "right to *take* life or *let* live" is sets at the basis of politics that in this way becomes the guarantor of life and safety of everyone (Foucault, 1997, p. 227).

THE GEOGRAPHY OF DIVERSITY

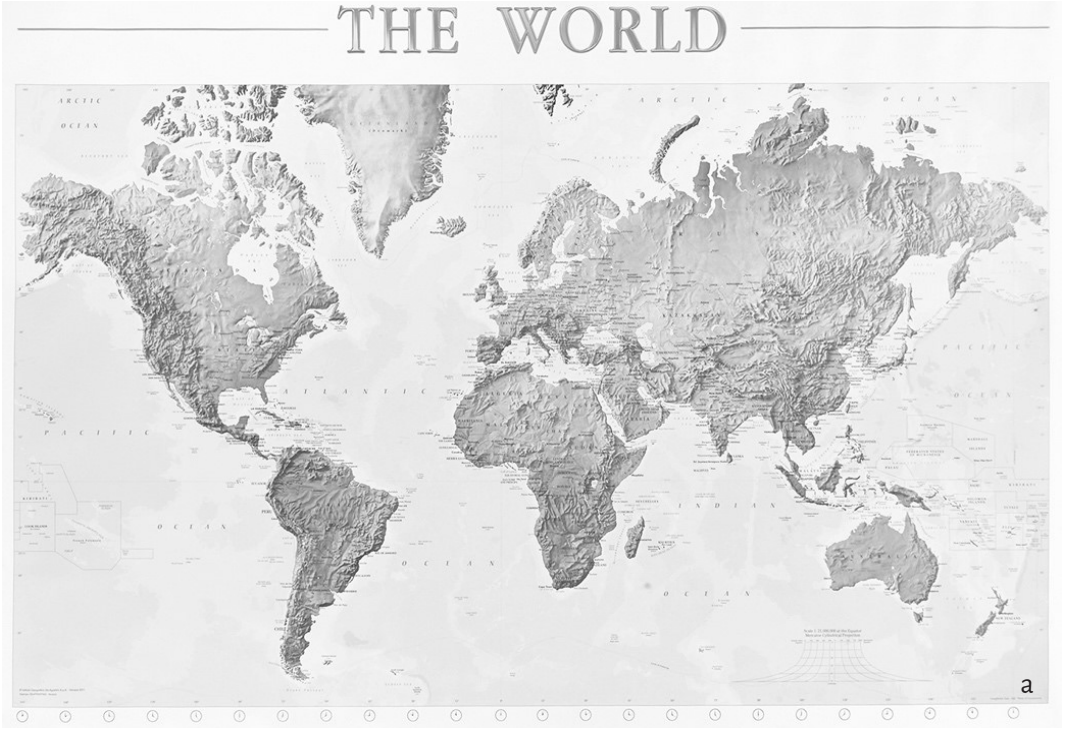
The considerations exposed so far allow seeing more organically the complex of the 63 walls built around the globe with purposes singularly different but similar after all. Their presence tells about a society in evolution, since a long time, towards a model based on an ideology centred on safeguarding the 'Self' through the negation of the 'Other'. The monumental architecture of this, without human presence, configures itself like a symbol and like other space at the same time (Foucault, 2010).The heterotopy, in this case, appears not only as a place of partial removal of the human itself but also as a total refusal of the human being, through its primary elements of definition: the culture of origin and religion.

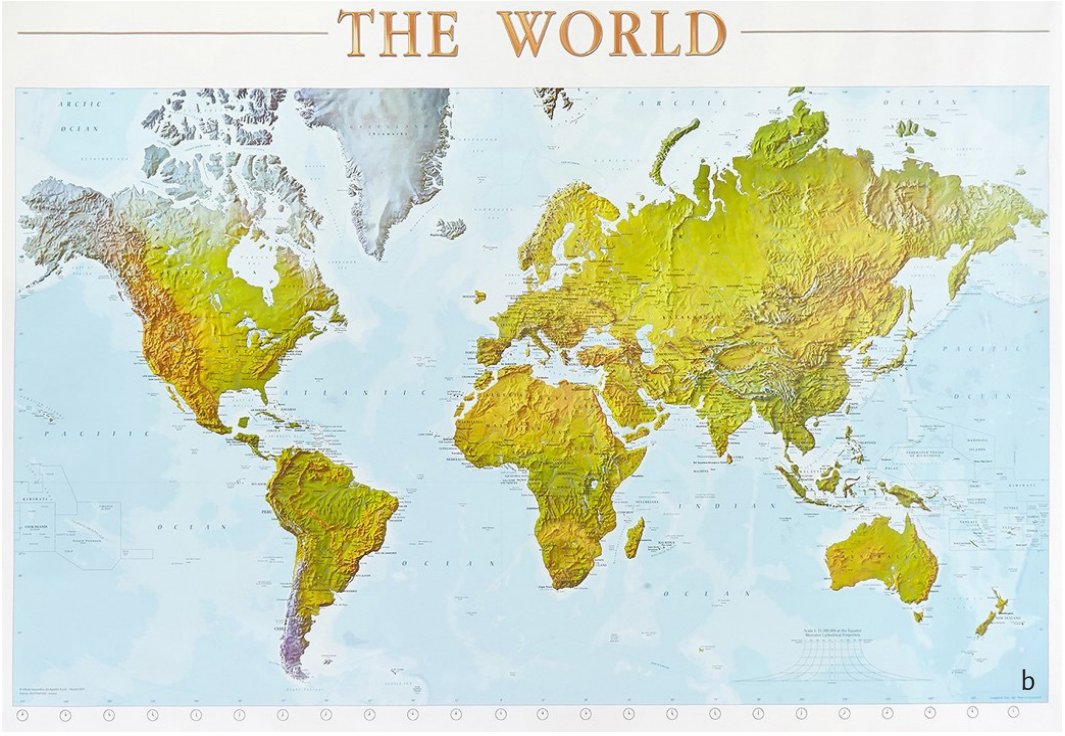
To describe this phenomenon visually, we represent it with a new geography that shows what is different from us, which is something that we experience continuously: "The presence of the enemies at the borders of her land, gives [to Fernande] the precious sentiment of the existence" (Clément, 2014, p.31-32). The Wall and the Difference are two entities closely connected and the attempt to remove them from the representation and the conscience is the first proof of their influence on our daily life. Let's think of the Israel/Palestinian wall, the *Green Line* of Cyprus or the walls that separate the city of Belfast, just to recall the more well-known and extreme cases.

So, the geography of diversity as a collection of all these heterotopies matches the representation of all those places that constitute a periphery of human conscience. For this reason, not all the barriers have a physical aspect, and sometimes they take place just in the separating power of the language. A paradigmatic example is the self-exclusion of Great Britain from the European Union, with the invention of the word *Brexit*.

Using the peculiar aptitude of cartography to represent reality through the transposition of actions into images (Falchetta, 2015), we have tried an attempt to making a map reporting as much as possible the ideology that leads to the action of building walls. A physical planisphere was used as a base

Fig. 6 Following page: World map, Istituto Geografico De Agostini © (a). World map to which 63 visual changes have been applied (b).


THE WORLD
a


THE WORLD
b

(Figure 6a), as it is the most consolidated and reassuring visualisation of the planet and it makes simultaneously visible the coexistence of natural features of the whole Earth.

At this map, 63 changes were done through the modification of morphological territories. New mountain chains, rivers and seas become the natural instrument for changing the image, right in those places where portions of space are denied to our conscience by the presence of walls.

This process of transfiguration determines a point of view that generates a new sight floating between the initial image and the final one, like in some Gerhard Richter' *Fotobilder.* This, therefore, becomes the gap between two worlds and two spaces, in which we can look at and try to measure the distances of the interruption of the reality (Garbin, 2012). The result is a different world, whose differences from the original are almost unnoticeable.

The opacity of result leads to reflect on the value of these new boundaries and to carry on this analysis work to make it further communicated through more media and graphic decoding. If these barriers, on one hand, might seem to go unnoticed, remaining indifferent to our visual experience, on the other hand, have the frightful power to change human geography.

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MEMORY AND ABSENCE
THE FAMILY HOUSE IN TWO AUTOBIOGRAPHICAL GRAPHIC NOVELS

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GRAPHIC NOVEL
COMIC BOOKS AND ARCHITECTURE
SEQUENTIAL DRAWING
ALISON BECHDEL
PACO ROCA

In this contribution, which starts with an analysis of the already consolidated relationship between architecture and comics, then tries to look deeper into the role of the family home within two graphic novels. Based on some theories, the comic book itself is a suitable medium for investigating stories related to buildings because the comic book pages recall the sections and shapes of the buildings. Looking instead into the merits of the two stories analyzed, beyond the obvious similarities and the inevitable differences between them, what emerges strongly is that the houses around which the stories rotate provide the opportunity to reflect profoundly on memory and absence. The accuracy of the details with which the two cartoonists manage to characterize their respective houses represents a refined exercise of memory and results in the houses themselves becoming protagonists of these stories, in which their respective fathers are absent, and whose lives have been spent in a large part in building those houses.

INTRODUCTION

The great interest of the world of culture in comics has roots far back in time and, although initially comics were considered an artistic expression dedicated mainly to childhood, throughout the last century this graphic language has evolved and has been definitively entrenched during the cultural ferment of the Sixties. Thanks to cultural contributions such as that of Umberto Eco with his book *Apocalittici e integrati* (Eco, 1964), this artistic language was raised to an instrument of mass literature, making it thereafter a category subject of academic study and forever changing the perception of audiences and critics who initially denied it the intellectual legitimacy that was intended for other equally popular media (Lus Arana, 2013b).

And today, without necessarily going deeper into scientific studies that place strips, comic books and graphic novels within the category of narrative iconic texts (Romero-Jódar, 2013), we can say that after several years of controversy and intense intellectual work, the comic book in its most general sense has finally reached the status of art. Indeed, if we compare it to a rather recent past, and probably due to the profound publishing crisis, comic books are increasingly becoming a niche cultural product (Cassarà & D'Urso, 2013). Despite this evident fact, we are still witnessing debates related to the legitimacy of the literary genre of graphic novels compared to comic books (Priarone, 2019).

The scope of this contribution focuses exclusively on the hypothesis that the graphic novel is nothing more than a moment of re-appropriation by comic books of a narrative and literary prerogative that it naturally deserved (Brandigi, 2013). Furthermore, the awareness that ante litteram authors of comic books such as Töpffer spoke naturally of drawn literature even before the comic book itself existed, effectively eliminating the problem of genres and the hierarchy between comic books and graphic novels and between words and images (Brandigi, 2013).

Similarly, as happened with other art forms, the continuous exchanges and relationships between comic books and architecture are not recent phenomena. Indeed, the architectural publications of the last thirty years demonstrate a constant production of articles and an increasing number of exhibitions which confirm the numerous overlaps between architecture and graphic narrative (Lus Arana, 2013a). Beyond its essential aspect, comics have always fascinated architects with their unique ability to bring together communication, space and movement (Lus Arana, 2013a). Indeed, the architects' current interest in comic books can be traced back to 1925, with the storyboard by Le Corbusier in the *Lettre à Madame Meyer*, in which the Swiss architect illustrated to a client his design concepts for the never built Ville Meyer through a series of sequential panoramas of the house (Lus Arana, 2013a). The sequential drawing finds its natural application in the representation of architecture, demonstrating its effectiveness in the conceptualization and development design phases as well as in the communication phases of the project (Bagnolo & Lusso 2019). In this sense, the contribution of Ingels with his archicomic *Yes is more* (Ingels, 2011) is emblematic. In fact, in this book the architect is simultaneously narrator and main character in a kind of conversation in graphic form in which

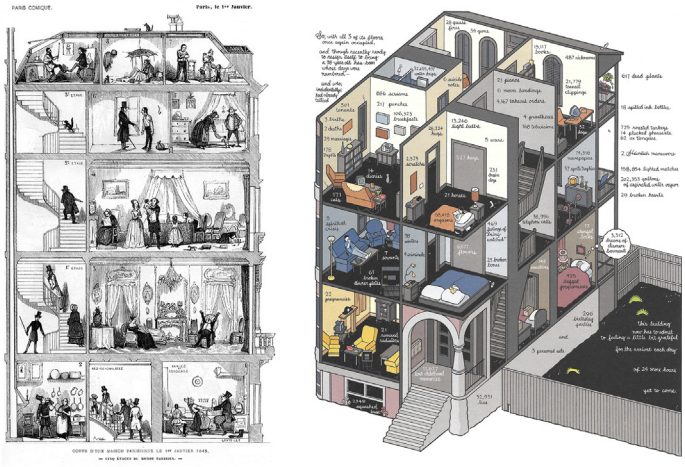

Fig. 1 Comparison between Bertall's illustrated table and one of Chris Ware's tables in *Building Stories*. On the left: retrieved April 23, 2020 from https://philippewillems.wordpress.com/purely-panoramic/; on the right: Ware, 2012.

he addresses the reader directly explaining the details of his projects through four hundred pages of photographs, diagrams, renderings and other images enclosed in panels and dressed with captions and balloons (Lus Arana, 2013a). Furthermore, the communication strategy used by Ingels is not so dissimilar from that used by Le Corbusier with his client. In this specific case we can conclude that the comic book has been adapted in order to serve the architect's objectives and this justifies the reason why the author uses the term archicomic to differentiate his book from conventional comic books (Pascoal, 2015).

BUILDINGS AND COMIC BOOKS: REFERENCES AND SIMILARITIES

Many scholars, in particular younger ones, have analysed the relationship between architecture and comic books. Among the most interesting works, often born as degree thesis or

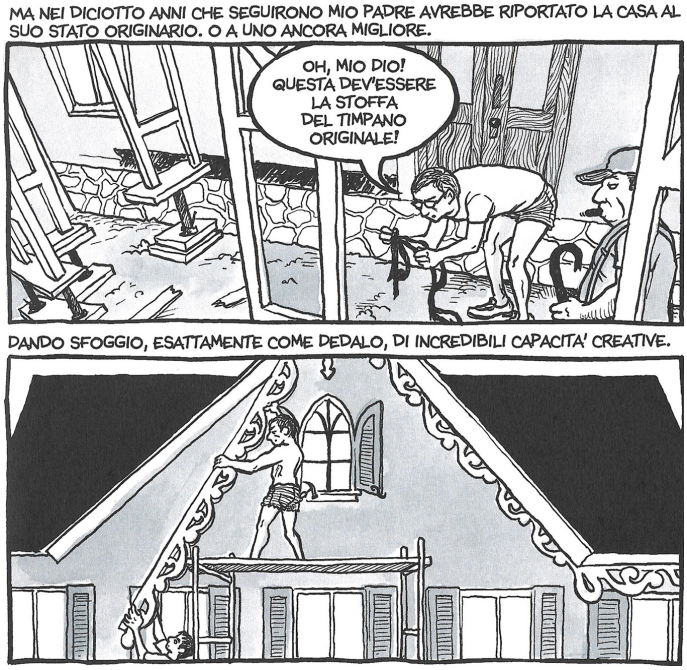

Fig. 2 One of the pages of *Fun Home* that portrays Bruce Bechdel intent on renovating the family home (Bechdel, 2007, p. 13).

doctoral thesis in the faculties of architecture, outstanding are those of Andrea Alberghini (2006), that of James Benedict Brown (2007) and, among the most recent, the works of Michela De Domenico (2013) and the Spanish Lus Arana (2013a, 2013b, 2019). However, most of these studies focused mainly on a particular aspect of the relationship between the two disciplines: that related to the representation of urban environments in comic books. The relationship between cities and comic books is full of meanings, lending itself to multiple readings and is constantly enhanced by the incessant production of themed comic books, inaugurated in 1982 with the series *Les Cités Obscures* by François Schuiten and Benoît Peeters. The main theme of this work is the critique of utopia carried out through imaginary fantasy cities originating from their real twins, while there are more recent and realistic examples such as the tributes to Venice of Taniguchi (2017) and Fior (2019, 2020) or for example the countless portraits of Berlin by Alberto Madrigal (Trizio, 2020).

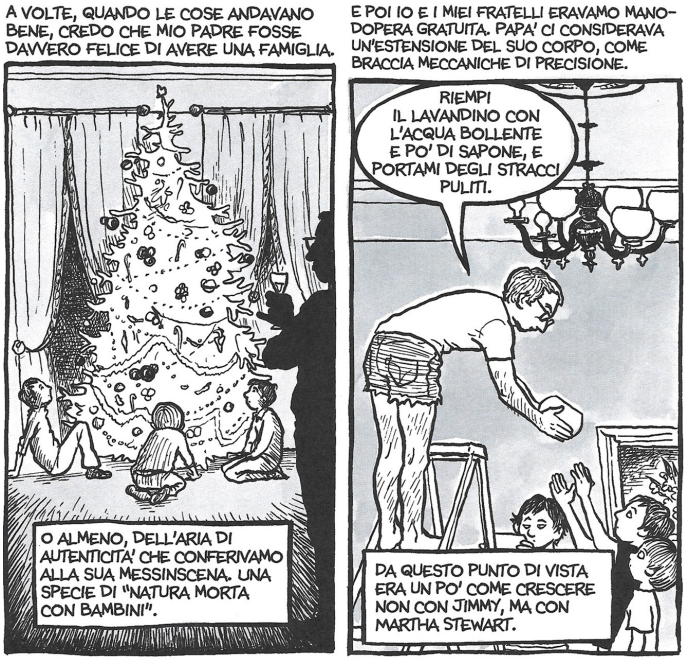

Fig. 3 One of the pages of *Fun Home* that shows the relationship of Bruce Bechdel with his three children (Bechdel, 2007, p. 17).

A probably more marginal aspect of the relationship between the two disciplines, though it seems equally interesting, is that which develops at the level of the single individual building. And in fact, according to Benoît Peeters himself (2013) in their formal setting, comic books offer small worlds made on a pleasant scale, images located in a familiar space, which can be kept under control and dominated. For Peeters the same space on the page in a comic book is, in turn, analogous to the space of the building with its floors, its corridors, its stairs (Peeters, 2013). Even for the scholar

Fig. 4 One page of *Fun Home* in which Alison Bechdel expresses all the contradictions of her family and, in particular, of the father figure (Bechdel, 2007, p. 21).

Chaterine Labio there is an architectural unconsciousness in the organization of the comic book page that significantly increases their reading skills, emotional power and popularity of the genre. For Labio, the page formats, different in different countries, correspond to the basic shapes and fronts of residential buildings in their places of origin and therefore the page always automatically evokes the meme of the house and it is always familiar to the reader (Labio, 2015).

The analogy between the formal structure of the building and the comic book page was probably sensed by the Frenchman Bertall as early as 1845. In fact, he organizes a panel in vignettes that coincides with the structural section of a Parisian building, in whose rooms it is possible to view scenes of the life of numerous characters (De Domenico, 2016). Being a precursor of the comic book, this work does not use the sequential reading of the images that will be acquired only later, but the idea is very good, and is in fact picked up and enhanced upon by Chris Ware in his *Building Stories* (Ware, 2012). Like Bertall, Ware pictures an old Chicago building in which the multiple events of its characters take place within its individual apartments (Figure 1). Ware uses architectural representation techniques and intersects axonometries, sections, elevations, technical details with the classic composition of the comic book (De Domenico, 2016).

The experimental format chosen by Chris Ware for his work, a box-of-comics within which there are 14 serial fragments of different formats, works as an archive that collects elements previously disseminated in different formats in various places and platforms, putting in place the archival aspect of the operation, in which the collection becomes an act of collaborative reading (Crucifix, 2018). In general, therefore, in its most obvious form, the conventional structure of the comic book page, with the overlapping stripes, brings to mind both the cross sections and the facades of multi-storey buildings and therefore not only the page retains traces of its architectural archetype, but it favors the work of the memory. In fact, these images generally remind us of the

primordial nature of our relationship with buildings, generally the familiar ones that are linked to our current self and to our childhood that generated it. The recurring search for the childhood home, be it real or imaginary, is a feature of the memory work done by comic books that justifies a large amount of autobiographical works produced by cartoonists in recent decades (Labio, 2015).

And precisely this last aspect, related to the search of the memory to which the comic books seem particularly suitable, is what we intend to examine in this contribution. In the next paragraphs, in fact, two autobiographical graphic novels will be analyzed in which the role of memory in the graphic story of the family home is central and for which the void left in both by the disappearance of the father figure is equally central, compensated by the material aspects of the the building itself, the house, which spontaneously becomes the star of the story.

ALISON BECHDEL'S *FUN HOME*

In 2006 the autobiographical graphic novel by Alison Bechdel entitled *Fun Home. A family tragicomedy* (Bechdel, 2007), was published. This volume in 2007 won the Eisner prize for best work based on real facts and is probably the most widely discussed graphic novel since Art Spiegelman's *Maus* (Kashtan, 2013). The *Fun Home* of the title refers, using an ironic play on words, not so much to the fun family home as to the contraction of the words that compose the term funeral-home, the activity that the author's father, an English teacher in high school, carried out on a part time basis.

The absolute protagonist of this graphic novel is evidently the home of the Bechdel family: the large Victorian building that the author's father obsessively restores with constancy and dedication for about eighteen years is polysemic and above all represents the meeting point between memory and identity. In fact, through the act of voluntary memory that the author performs through the creation of

Fun Home, all the poetic and creative character of the house emerges (Labio, 2015) which played a fundamental role in the construction of the individual the author became. The obsessive restoration work carried out by Bruce Bechdel, a latent gay man who loved architecture in style and interior design (Figure 2), clearly betrays his firm obstinacy of denial and repressing his homosexuality and willingness to work constantly not only to the construction of the house, but also to that of the perfect family image. *Fun Home* shows Bruce Bechdel intent on relentless renovation of his home in the

Fig. 5 Composition of two stripes of *Fun Home* in which the house, seen from the outside, represents the element that unites all members of the family who are, in reality, emotionally alienated from each other (Bechdel, 2007, pp. 138, 143).

same way he tries to repress the ghosts of his desires. The relationship between the desire for order and cleanliness and the containment of private desires and fears is still very present in contemporary popular culture. In fact, the phenomenon on the basis of which more and more television programs are being broadcasted in which homes are being renovated is a broad demonstration of this, which indicates how the metamorphosis of the house still represents, for our society, the miraculous transformation of disorder in order and clarity (Lydenberg, 2012). The need to transform disorder

Fig. 6 A page of *Fun Home* that represents the library of Bruce Bechdel, the real center of the house (Bechdel, 2007, p. 64).

into order is equally evident in *Fun Home*: the heterosexuality that Bruce Bechdel tries to manifest through the obsessive care of appearances is intertwined with an idealized model of class identity to which he ardently aspires, and both are incarnated with his own home (Lydenberg, 2012). As a parent, Bruce Bechdel is equally incapable: he is unable to establish an emotional and physical relationship with his children and he is completely paralyzed by the fear of showing his sexual orientations which he tries instead to dissimulate through his continuous work (Figure 3). He is at the same time the victim and architect of his deception staging (Gennero, 2009) which will end with his untimely death which will take place a few weeks after his daughter's coming out.

Through a memory work as meticulous as that of her father in the restoration of their house, the author in the reconstruction of their relationship manages to highlight how all the scenic apparatus built by the father is part of an overall strategy of concealment and removal (Gennero, 2009). In the story narrated by Alison Bechdel, fiction and reality are constantly mixed and the established Catholic family lined up in the front row at Sunday mass does not really exist (Figure 4), and is very far from that portrayed in the vintage photo showing the original inhabitants outside their new home in neo-Gothic style that simultaneously reflects their class position and the traditional family nucleus (Lydenberg, 2012). The family photos staged by Bruce Bechdel are instead carefully constructed to suggest family unity and an equally uniform normality but not very close to reality. And in fact, Bruce Bechdel is portrayed by his daughter always active, wearing shorts, but the image of masculinity he portrays is actually very far from that of the stereotype represented by his neighbors, and by the rough hunters who populate the provincial town. In practice, Bruce and the Bechdel are at the same time imposters and a real family (Gennero, 2009) and the thread that unites them and simultaneously divides them is precisely the house that they live in. Among the continuous contradictions highlighted within this graphic

novel is the very strong presence of the father who with his complex personality crushes those of the other inhabitants, a presence that is amplified because of the evident absence of the maternal figure, completely canceled by the pater familias. Despite his presence, his daughter feels he has always been absent, concentrated in his efforts, to hide his true nature, to renovate the house, which effectively alienate him from his family. This constant confusion of presence and absence occurs in the visual representations of the domestic space, where the family members are often shown in

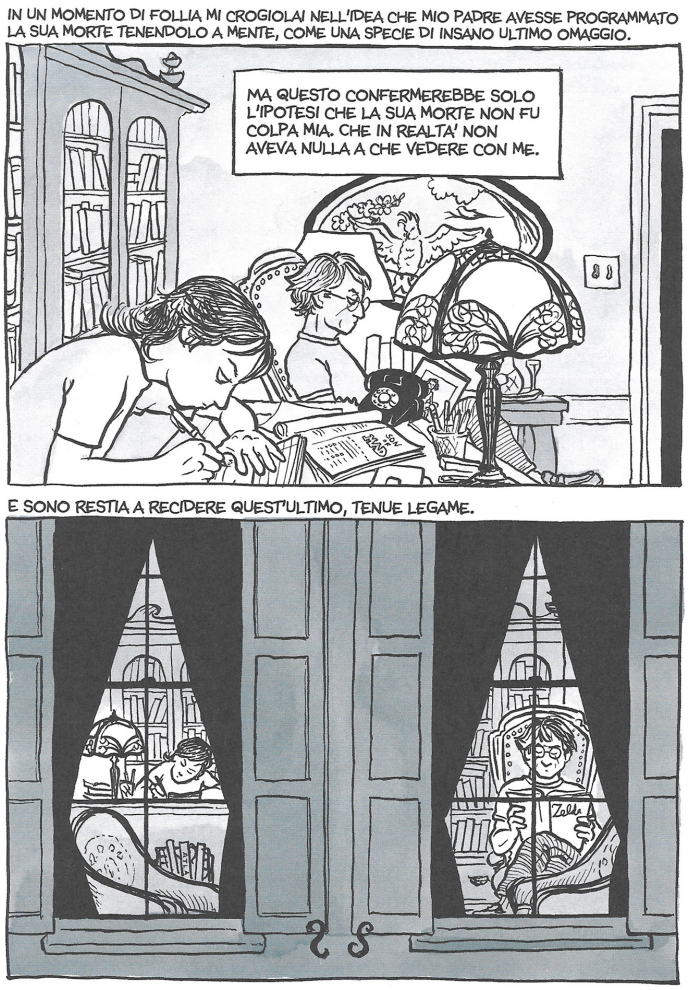

Fig. 7 A page of *Fun Home* that portrays father and daughter together in the library which, seen from the outside, seems to be two separate rooms (Bechdel, 2007, p. 90).

Fig. 8 The final strip of *Fun Home* that portrays Alison as a child in the act of diving confidently into her father's arms (Bechdel, 2007, p. 236).

close physical proximity but emotionally estranged. Bechdel ingeniously uses the architecture of the family house, seen from the outside (Figure 5), to strengthen the isolation that characterized life in the family home (Lydenberg, 2012). Furthermore, if the family home is a fundamental character in this memoir, Bruce's library is the heart of this character (Figure 6) and, in the midst of a tense domestic life, the passion for books offers the family members moments of truce. Furthermore, the shared love of books also allows father and daughter to share moments of connection.

The house in general and the library in particular bind them together and the fragile and twofold nature of their relationship finds a meeting point in their respective homosexuality. In a memorable scene of the book father and daughter are portrayed together in the library, but through a graphic artifice it is the structure of the house itself that separates them and in fact the daughter is seen through a window writing or drawing while the father (Figure 7) is shown through another intent on reading (Labio, 2016). The library contents themselves have played a fundamental role in generating the author's conscience, and in the design of this book, in particular works such as Proust's *Recherche*, and in fact the house and books represent, respectively, for the author and his father, the key to remember and to create (Labio, 2015). And if the father is trapped inside the building that he has painstakingly built in his image and likeness, without ever truly accepting himself, Alison finally gets rid of the house through *Fun Home*. The tragedy of Bruce Bechdel, whose death will never be known if by accident or suicide, represents a tribute by the author to the sacrifice of many men and women crushed by the weight of homophobia. At the same time, it represents an inspiration for his daughter to remain true to herself and her desires which her father had tried desperately and in vain to remove (Gennero, 2009).

The final scene of the book thus takes us outside the physical and emotional boundaries of the house that for Alison as a child represented a dangerous labyrinth, in an outdoor

swimming pool where the adult woman, now free and self-confident, makes the girl complete, confident, a dip in the arms of her father (Figure 8), at the same time making a leap of confidence beyond the security of things and rigidly constructed identities (Lydenberg, 2012) finally giving way also to the nostalgia that absence generates.

PACO ROCA'S HOUSE

About ten years after the publication of *Fun Home*, *La casa* was published in Italy, by the Spaniard Paco Roca (2016). Like the previous one, this too is an autobiographical graphic novel with a strongly Proustian flavor, but the emotional, social and cultural context between the two works is completely different. In *La casa* we are no longer in the American province of the seventies but in the Spain of the post Franco

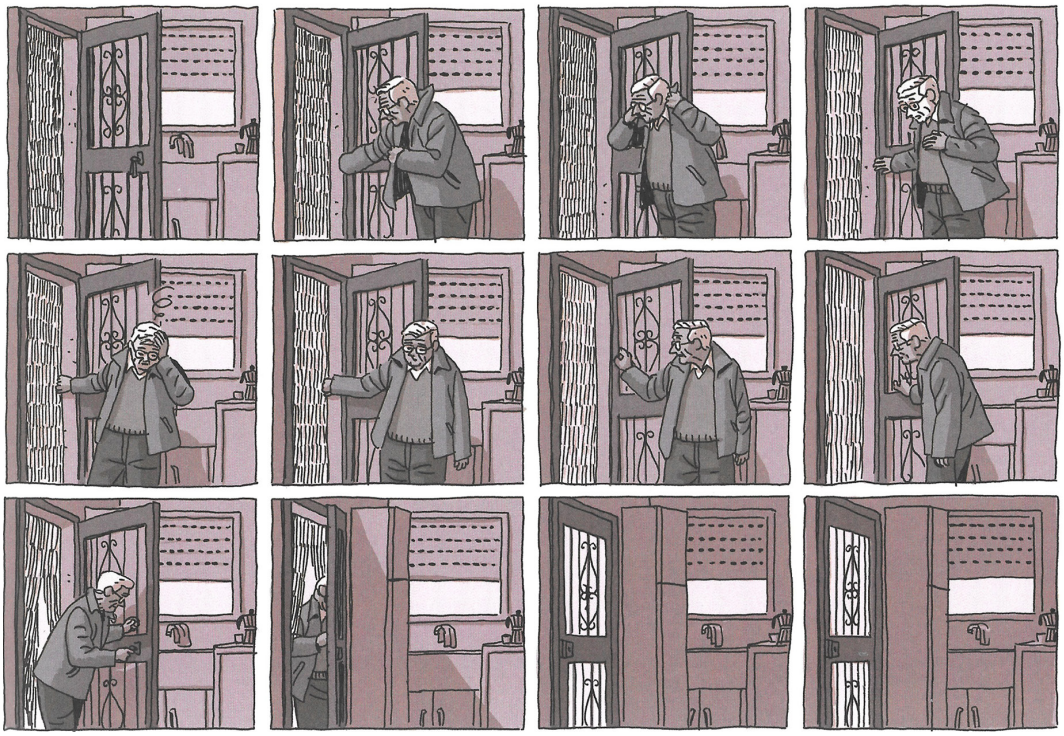

Fig. 9 The initial page of Paco Roca's graphic novel with the departure of the father (Roca, 2016, p. 3).

transition and the background of the two families is very different. The difference between the family narrated by Alison Bechdel, of middle class intellectuals and that narrated by Paco Roca, who has working class origins, is substantial and is probably also at the basis of the complicated psychological implications of the first compared to the less knowledgeable and more serene environment of the second. In spite of the obvious differences, both authors entrust to memory the substantial task of understanding one's actual being through the reinterpretation of personal stories trusting on memories. Paco Roca is not new to the use of memory in his comic books, as he brilliantly demonstrated in his previous graphic novel, *Rughe*, which tells us the story of an elderly man with Alzheimer's disease (Roca, 2013) whose memories are desperately kept together with all their strength before the disease takes over by totally wiping out, a piece at a time, his memory (Bellu, 2016).

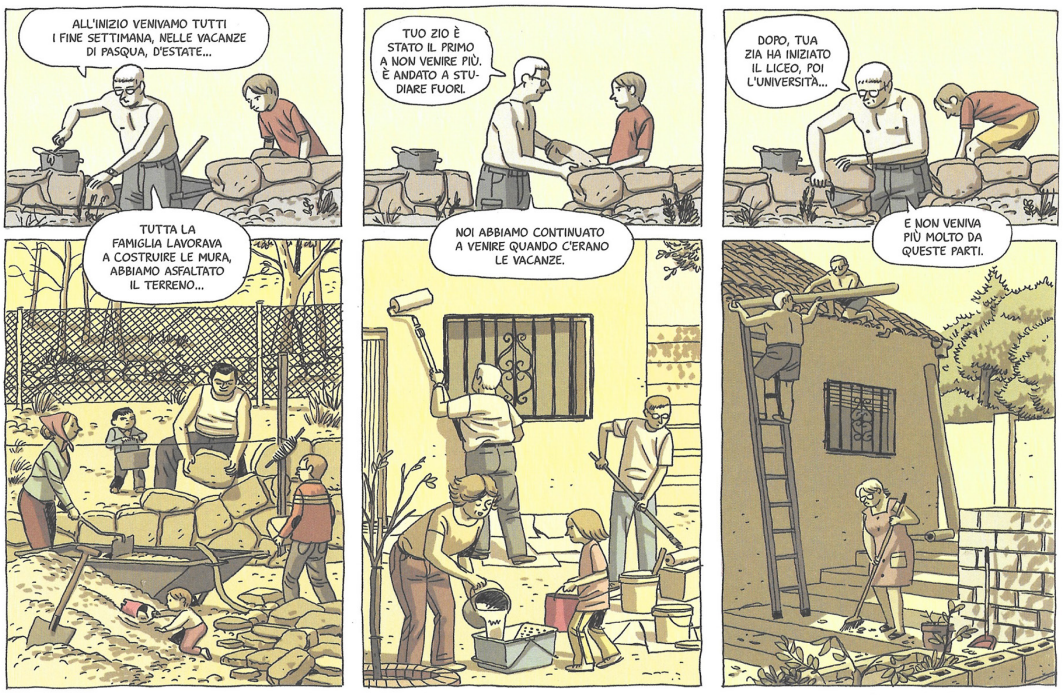

Fig. 10 A flashback showing the family protagonist of the story involved in the construction of the house (Roca, 2016, p. 74).

The story behind this work by Paco Roca is very simple and begins with the literal departure of Antonio, the man who represents the father of the author, who on the first page leaves the house never to return (Figure 9). A year after the death of this man, his three children, one of whom, José, is the cartoonist's alter ego, return to the house with the intention of putting it back in shape for a future sale. By moving the accumulated objects, exploring the rooms, moving relentlessly between the garden and the garage, the three give the house, but above all to themselves, a new possibility (Corno, 2016). Unlike the Bechdel family, Paco Roca's house is not the family home but is the holiday home, also in this case built by the father piece by piece during the long summers with the help of his three children (Figure 10). For Antonio, the construction of a holiday home, pursued obsessively, above all represented the attempt to approach, at least apparently,

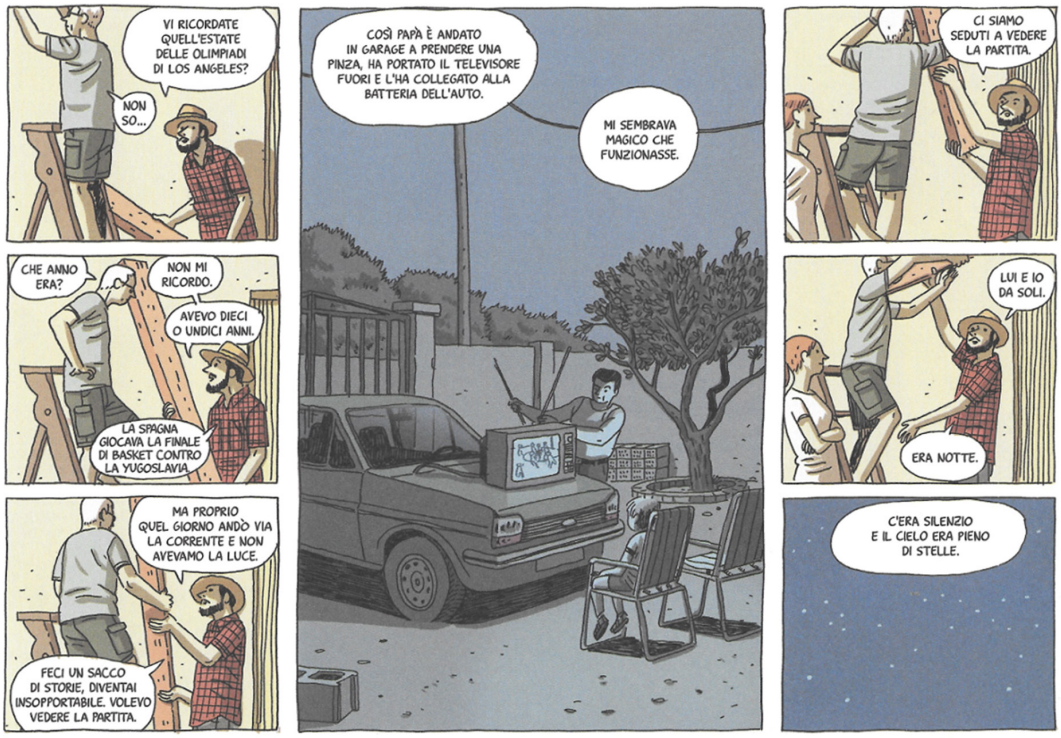

Fig. 11 In the center of the page, in flashback, one of the episodes remembered by Antonio's son (Roca, 2016, p. 101).

a certain social status. And, if for Bruce Bechdel the renovation of the house, for which he claimed the labor of his children, has emotionally strong implications, for Antonio it only represents earning his own space in the world: by putting the children to work Antonio shaped the space around him and dominated it, thus making it part of the family (Corno, 2016).

While for the Bechdel family the house represents a formal link between its inhabitants, for the three sons of Antonio the construction that also physically involved them in their childhood, even if imposed by their father, actually created a bond between them, and, on the occasion of the recovery of the building, this bond resurfaces and they find themselves again as a family. The three children will begin the renovation work first individually, then meet and confront each other, highlighting the different characteristics of their personalities and their relationship with the father.

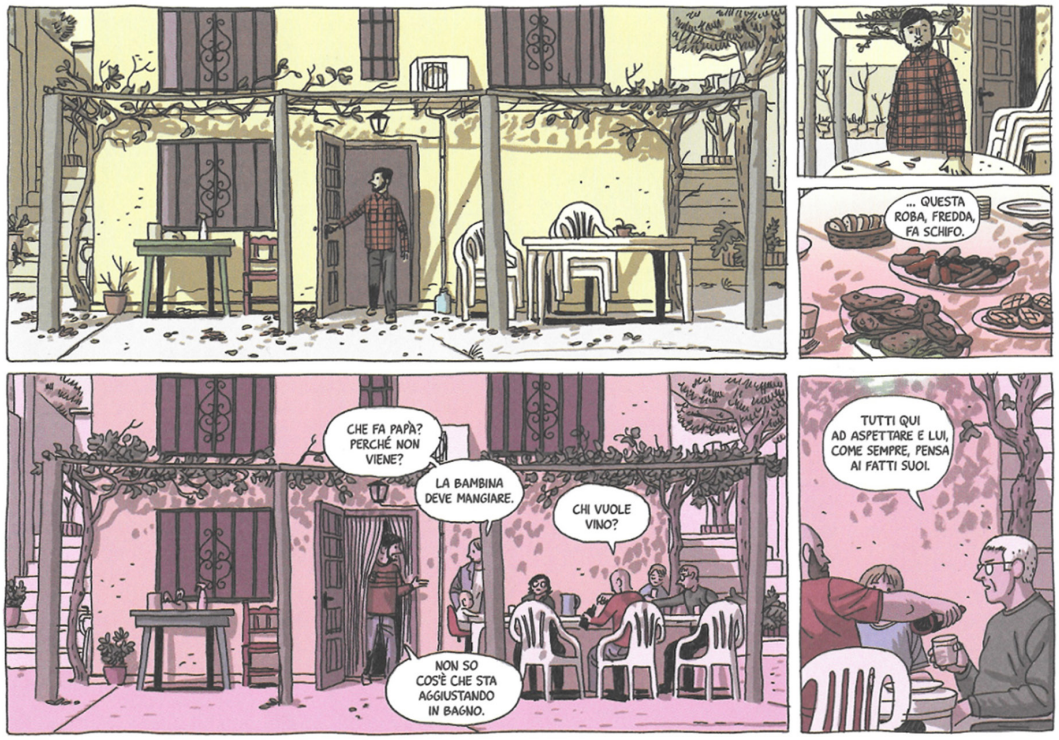

Fig. 12 One of the flashbacks of the story described with evident color change on the page (Roca, 2016, p. 8).

Through the memories of the three children, the identity of the father is traced, a simple and shy man, in continuous discovery of himself, of the man and his home, perhaps both to be revalued (Costanzo, 2016) and perhaps known to everyone only superficially. Also in this graphic novel, as in *Fun Home*, that of the restoration of the house is a metaphor that implies constant work on the construction of oneself that the author makes in this journey in memories that is left to flow in its impetuosity, with its small and great tensions, misunderstandings, but also tenderness and lightheartedness (Bellu, 2016). In this comic there are numerous narrative fragments that are remarkable for their emotional strength as well as the flashbacks that melt into various episodes: from that of the Olympics seen with the TV placed on the hood of a car (Figure 11), to the bathroom in a makeshift bin, to a signature on the wall after building it (Bellu, 2016).

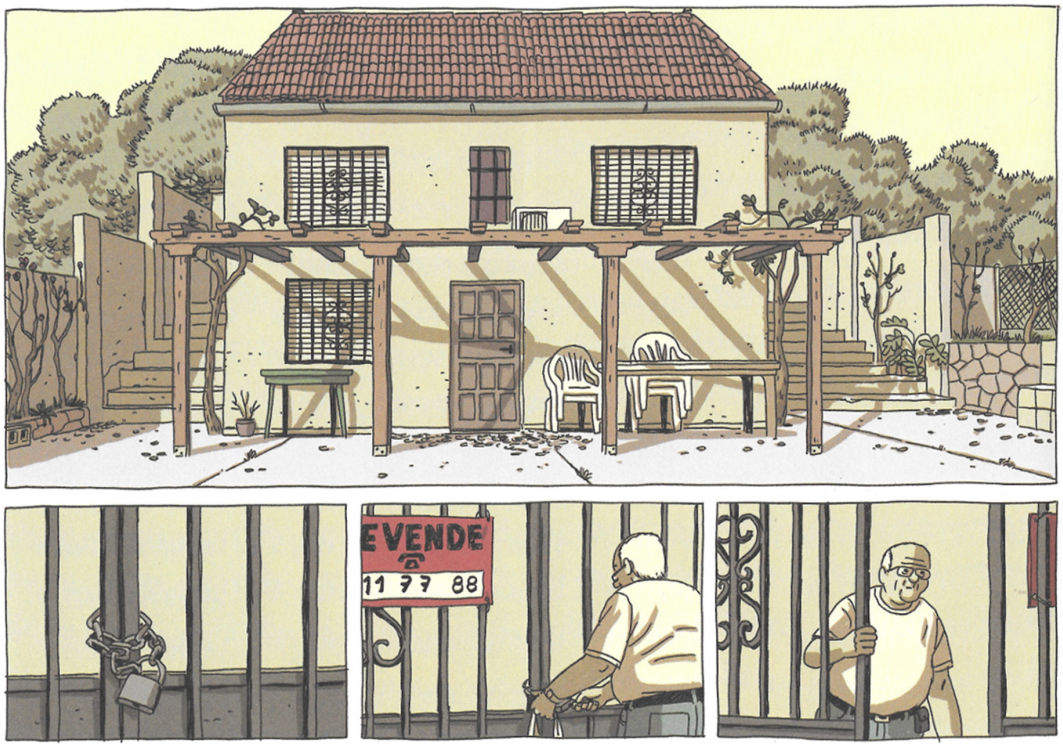

Fig. 13 One of the final tables of the history (Roca, 2019, p. 122).

From a purely technical point of view, while *Fun Home* is monochromatic, a choice that highlights the drama of the story, and that allows attention to be focused on the characters, in the Paco Roca comic the role of colors is fundamental. In fact, the time difference between the present and the past, as well as the changes of the seasons or the mood of the characters, is achieved through the evident color changes of the cartoons (Figure 12). Even the format chosen by Paco Roca is not accidental: contrary to all his previous works, this comic has a horizontal development. An aspect that makes the story familiar to the reader because the shape is that of an old family photo album, where the cartoons follow one another like many images that mark the important moments in the life of a group of people united by a blood bond and affection (Giai Via, 2016). The strength of this story, when compared to the complexity of the previous one which is decidedly very subjective, lies in its being a universal story, so realistic as to be real. The house becomes a meeting place for each of us, a testimony of our history, so much so as to merge its foundations with our roots (Costanzo, 2016). And in the end it is not so important for the reader to know if the house will be sold or will remain to the sons in order to keep with it the memory of the father. What is important is to have reestablished the existence of a deep bond by those who shared moments in it and retain their memories (Figure 13).

CONCLUSIONS

According to Sattler, cartoonists are fully aware of how easily comic books can be forgotten, and therefore approach the theme of 'memory' as a central pillar around which to discuss how their medium works, not only on the page but also in the readers' mind (Sattler, 2010). In these two graphic novels, both authors show that they are fully aware of how fundamental this topic is to them. In both *Fun Home* and *La casa*, the theme of memory is central, and revolves around

that of the home, but if for Paco Roca memory is identity, and in particular claiming that it is the form itself through which it is possible to define one's own personal identity (D'angelo et al., 2017), for Alison Bechdel memory creates the possibility of liberation and affirmation of one's identity. Beyond this, what these two works have in common is the characterization that both authors make of the moods of the characters, but also the extreme attention to the details of the furnishings and the appearance of the building itself, details that transform the house into a living being, testimony of joys and sorrows, of anxieties and repressed desires, which bears the signs of the existences that have gone through it (Martinolli, 2016), details that give it a precise identity and make it the protagonist (Costanzo, 2016). The absence of the two paternal figures is therefore compensated by the material presence of the two buildings strongly desired by both, although for different reasons and which, in fact, replace them. Ultimately, the players in these two stories are the fathers, the children and the houses that, with their objects and with their precise and meticulous description that make them the sons, become main characters replacing their own craftsmen, great absentees of these stories. As Roca himself admits, the real protagonist of this story is the house itself, as a container of memories and as a symbol of the father (Canessa, 2016).

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WHEN DOES THE IMAGE BECOME A DOCUMENT?
MORE HISTORY OF REPRESENTATION FOR NEW DRAWINGS

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HISTORY OF REPRESENTATION
ARCHITECTURAL DRAWING
DIGITAL POST REPRESENTATIONS
DRAWING THEORY
LINEAMENTA

Images risk homologation. The ever-greater ease with which we can acquire, generate, reproduce and communicate images, together with current intercultural tendencies (too often dictated by globalization), impose continual historical-technocultural reflections on criticism. Studies able to critically elaborate the state of the art of architectural representation, high-lighting positivism and negativity of the revolutionary conquests of humanity. In its general aspects, the theme is known, and has been variously treated by critics who have debated opportunities and risks.

Especially in those disciplines where 'to represent means to conform', as for architecture, the exceptional potential energy contained in the current post-digital techno-cultures imposes specific cultural deepening. One of these concerns the risk of homologation and 'improper' use of the meaning of architectural images: representations which, between real and virtual, ideal and utopian, materialize, in a historical context, the sense of human living.

The antidote to the images homologation here proposed is known and consists in amplifying and updating the historical knowledge of the phenomenon: it means, in short, decoding, contextualizing in a historical path and transforming into knowledge that pervasive flow of images (information) we are all continually subjected to.

That's why, against the risk of the images homologation and their conformative use, I hope more history of representation!

IMAGES RISK HOMOLOGATION

Today more than ever –often due to (direct or indirect) conformative elaboration processes, sometimes derived from an 'unconscious' use of the medium of representation– images (genetically belonging to the poetic world of ideas) risk homologation.

More and more often, in different processing contexts –both in research and in teaching (reading essays, attending conferences, revising papers, observing pedagogical processes, talking with students, etc.)–, it seemed to me to detect a sort of 'delay' between the processes of historicization (understanding) of the architectural representation with respect to the revolutionary technocultural transformations that have affected images in recent decades (but not only).

By stopping at the actuality of images in our post-digital era, it is important to remember, simply, that the phenomenon of today's digital representation is the last result of a long process of technocultural order; it is a phenomenon that obviously depends not only on current innovations but also on previous ones; it is a phenomenon that bears the value of inheritance, often neglected in the analysis processes.

The risks of not contextualizing images in their historical path is always very high, especially today, when we are so attracted by their continuous spectacular outcomes.

Many research themes emerge that impose on scholars continuous historical-techno-cultural reflections, able to critically elaborate the state of the art of architectural representation, highlighting positivism and negativity of the revolutionary conquests of humanity.

We would like to point out that the study presented here is the latest outcome of a research (still in progress), elaborated by the author (cf. bibliography), on the multiple declinations of the history of representation. Here we try to list some topics related to the semantic value of the image, among the many possible ones:

- the issue of the pervasiveness of digital images (internet, social networks, etc.) and their abuse. To what extent the ease of access to audio-visual (in general) can destabilize thought?

- the issue of the reading and conservation of digital audio-visual heritage (conservation and exhibition of works, ensuring hardware and software to continue to work on 'outdated files'), in its various representative cases, from art to architecture, from web design to virtual worlds up to videogames;

- finally, how are the last frontiers of post-digital representation (from research on 3D printing to parametric design and BIM to big data management, etc.) increasing creativity, changing training and profession?

And what are the effects on the conformation of space and products, considering also the digital divide and the contemporary *modus vivendi*, often destabilized by globalization?

Let us now try to think about 'how' to trigger processes that can historicize images.

MORE HISTORY OF REPRESENTATION!

In its general aspects, with different tones and arguments, the complex theme of research in the field of the history of architectural representation and its teaching in the field of education, is known and the subject of various studies and thematic studies –on which we will return later (see Additional readings), when we recall some precious references– but nevertheless the history of architectural design still seems to be elaborated.

Vittorio Magnago Lampugnani, director of the exhibition named *The adventure of ideas in architecture 1750-1980 (XVII Triennale di Milano)*, thus introduces the project on the far 1985: "*La storia dell'architettura, soprattutto quella recente, è una disciplina trattata in modo alquanto insoddisfacente.* [...] *Solo ultimamente si ravvisano alcuni singoli tentativi di bilanciare con serietà* [...] *le insufficienze di una concezione deterministica della storia dell'architettura come prodotto di sedimentazione del sociale.* [...] *abbozzi di una storia dell'architettura come storia delle idee, in cui la visione complessa si sostituisce al determinismo lineare*".

On the exhibition he comments: *"nove sezioni trattano ognuna una determinata idea di architettura, dallo Storicismo al Razionalismo. Da una parte vengono esposti disegni e modelli architettonici, dall'altra opere di pittura e di grafica, fotografie, estratti di film nonché citazioni letterarie e filosofiche che rispecchiano lo spirito del loro tempo.* […] *le 'avventure delle idee' si rivelano*" (Magnago Lampugnani, 1985, p. 15).

In the early 1990s, Roberto de Rubertis writes: *"il disegno di architettura, pur ampiamente analizzato sotto molteplici punti di vista, è stato finora scarsamente sottoposto ad indagini storiche di tipo ermeneutico. Manca in particolare un approfondimento conoscitivo sulla trasformazione dei significati che ciascuna rappresentazione architettonica subisce nel tempo ad opera della modifica dei codici e delle conseguenti interpretazioni prodotte da ciascun ambito culturale*" (de Rubertis, 1994, p. 119).

So Mario Docci recently writes: *"è auspicabile che i giovani si dedichino alla ricerca storica nel settore della rappresentazione, poiché malgrado siano stati affrontati alcuni studi nel settore del rilievo e del disegno a mano libera, una vera Storia della Rappresentazione è ancora in gran parte da scrivere*" (Docci, 2018, p. 20).

The need to historicize the architectural drawing –as a graphic document, a precious testimony of ideas– to understand the evolution of the architectural languages is fundamental and supported.

Today, in a period that we can define as "post-digital maturity" (Unali, 2019), studies on the history of representation (from the history of drawing to visual studies) must be implemented and updated, especially with respect to the results of the use of technocultures; moreover, the theme was preceded by foundational studies on the idea of representation (as, for example, the works by Walter Benjamin and Marshall McLuhan testify, just to cite the best known authors on an international level) that, since the 1960s, have reported the importance to know the expression-conformation medium.

The latest studies on post-digital representation, which attempt, in the specificity of their disciplinary interests, to analyze the multiple facets of the topic (highlighting themes,

opportunities, risks and possible image evolutions), are few and still appear in their 'experimental' phase.

These studies configure themselves as collective and shared studies, between research and teaching.

The risk to use images outside of the historical knowledge of the phenomenon, with all that it means on the sense of the proposed visual project, is still high.

Especially in those disciplinary sectors where 'to represent means to conform' –also in the Albertian sense of *Lineamenta*– as in the case of architecture, the exceptional potential energy contained in the current post-digital technocultures imposes specific cultural deepening.

Therefore, as already anticipated, against the risk of homologation and 'improper' use (often shaped by the used medium) of the sense of architectural images (representations that, between real and virtual, ideal and utopian, in a historical context, materialize, the profound sense of human living) the first antidote proposed here is well-known and consists in expanding and updating the historical knowledge of the phenomenon: decoding, contextualizing in a historical path and transforming into knowledge that pervasive flow of images (information) that we are all continually subjected to.

KEY WORDS: TERMINOLOGY, SCIENCE,TECHNOCULTURE

The history of representation is a kaleidoscope ordered by many historical creativities: from drawing methods and techniques to the evolution of architectural and urban surveying (such as cartographic), to the inventive drawing (ideal, utopian, radical, virtual).

Here we will try to outline just some of these themes, reflections, doubts and key words concerning a possible setting of this research (among many possible) on the history of architectural representation. In continuity with the prevailing hypothesis of historicization of the architectural representation, recently object of interest inside the

scientific community, I will try to outline just a few further processing ideas, in the form of key words.

In the editorial of the journal *Disegnare idee immagini* n. 56 (2018), signed by Mario Docci and Carlo Bianchini, the main paths of study and development of the history of representation have been summarized as follows: *"il primo è quello dei fondamenti scientifici della Rappresentazione e dei cosiddetti 'metodi'; il secondo attiene alle applicazioni, cioè alle tecniche di rappresentazione, alle convenzioni grafiche, alle simbologie e in generale all'operatività del processo sia in termini di prodotto che di processo; il terzo riguarda gli strumenti impiegati nella rappresentazione, da quelli elementari a quelli più sofisticati e complessi"* (Docci, Bianchini, 2018, p. 3).

This topic, broad and complex, requires a generous cultural sharing that sees specific skills at work –from the science of representation (descriptive geometry, methods of representation, etc.) to visualization techniques (tools, norms, etc.) up to expressive aesthetics (composition, iconic, symbolic meanings, etc.)– and interdisciplinary knowledges of a technical and cultural nature. As already mentioned, let's try to draw further elaboration notes concerning three key words: Terminology, Science and Technoculture.

Terminology (classification, timeline, ...)

The first step towards the elaboration of a research on the history of architectural representation is to clarify, update and share the terminology that describes the various types of architectural images, from the historical drawing (authorial works, treatises, artistic representations, etc.), the wide and differentiated graphic production of contemporary architects (from project to survey), to the multiple images that can be inhabited on the web (from virtual world to videogames). The terminological question invests across the entire architecture, from research to teaching to profession, providing basic 'tools' to qualify architectural images in relation to other images, highlighting the meanings and values of drawing in reference to the various stages of the creative process.

Let's consider also the need to define and share a glossary of terms that describe the multiple potentialities of digital image.

Another important role played by studies on the terminology of architecture involves the protection of the classical historical languages of the discipline, foundational expressions of the meaning of its elaborations.

In this globalized era, where often some linguistic and terminological specificities (handed down between tradition and innovation) lose their historical characteristics, sometimes watered down by forced translations or, worse, replaced by different terms, this is of fundamental importance.

Consider, for example, the terminology in the treatises which, especially in the architecture history, finds meaning if it is read and understood in the specific terminological meanings of the presented subjects.

How can we translate, for example, the meaning of the term *Lineamenta* (title of a chapter of Alberti's *De re aedificatoria*)? How to explain the term *Concinnitas*?

Finally, the terminological question concerns other aspects including the processes of cataloging and classifying graphic documents and their subsequent synthesis through thematic maps and timelines.

Science (methods, models, ...)

Within the sciences that affect architecture, drawing seems to be the main one, the most pertinent one, foundational and transversal to all the others.

In particular, studying and analyzing the history of Descriptive Geometry in relation to the evolution of the methods of representation of architectural languages means to understand and evolve the science of drawing, thus making it always current.

Among the many topics opened by the subject, I remember, for example, the studies on the relationship between methods of representation and architectural languages. Often method becomes a conformative model of the language that expresses.

This can also happen in different periods of history, with different meanings as well: as in the case of axonometry, from Neo-Plasticism to Pixel Art. "*Le plan est le générateur*" (Le Corbusier, 1923)

Both in research and in teaching, the science of representation affects the work of many scholars. Among those I remember the contribution of Riccardo Migliari who, among other things, managed to keep the historical origins of the phenomenon together with the most recent innovations fueled by digital revolution.

Reconstructing the history of the teaching of Descriptive Geometry in the Faculty of Architecture in Rome, he wrote in 2001: "*L'architettura è una espressione artistica che si serve di un paradigma scientifico. Si può e si deve fare ricerca scientifica in ambito disciplinare, ma il progetto di architettura resta un momento di creatività pura. Bisognerà perciò distinguere, tra questo momento assolutamente creativo, e il momento della realizzazione, nel quale intervengono tecnica e tecnologia. Nel primo momento la immediatezza e l'espressività della matita, al secondo le macchine. Ma tutto ciò riguarda l'esteriorità delle cose, quei prodotti, e sono per lo più immagini, attraverso i quali l'architettura si mostra prima di essere realizzata*" (Migliari, 2001, p. 287).

On training: "*Ora, perché tanta insistenza sui modelli, perché tanta attenzione a trasformare le cose in immagini e le immagini nelle cose? Perché la prima dote di un progettista è la capacità di immaginare lo spazio e modellarlo nella sua testa, e questa capacità si acquisisce, appunto, confrontando le idee con la pietra, o con i modelli. Si potrebbe pensare, paradossalmente, ad un corso di Geometria Descrittiva nel quale la descrizione, appunto, è affidata unicamente alle macchine, ma resterebbe pur sempre il problema di collegare la descrizione informatica all'oggetto reale. A riguardo, l'iperrealismo di certe simulazioni non deve essere frainteso: solo in apparenza quella immagine è fedele, ma ad esaminarla più attentamente ci si rende conto che è molto più distante dalla realtà di quanto non sia lo schizzo di una mano esperta. E perché mai? Perché la simulazione è la traduzione automatica di dati metrici e formali in immagini, mentre lo schizzo è la lettura intelligente di uno spazio.* [...] *l'avvento*

delle macchine non solo non ha cancellato il disegno di invenzione, ma lo ha reso di molto più prezioso" (Migliari, 2001, pp. 287-288).

Observing the (current) post-digital architecture drawing, these arguments open up further elaborative ideas.

Technoculture (techniques, know-how, ...)

In the wake of the historical tradition, in the awareness of the meaning of the Greek term Téchne ('art', in the sense of 'know how'), I want to remember the importance of studying the evolution and use of architectural drawing techniques.

The famous Latin phrase *Nulla dies sine linea* and the well-known reflection on technique attributed to Pablo Picasso, *"averne tanta e poi tanta da farla completamente cessare d'esistere. A questo punto, ecco, è importante averla. Perché mentre lei fa il suo lavoro, tu ti puoi occupare di ciò che cerchi*", metaphorically describe the general meaning of the topic here proposed.

From watercolors (I think to Steven Holl's ones) to photomontage (I remember the images by the Florentine radical workshops in the '70s), from the textures of space and shadows (I recommend the images by Franco Purini) to the color (in the Aldo Rossi's sketches), techniques and tools with which the drawings are performed are among the essential characteristics to understand the communication meaning.

We must also point out that before digital revolution, architectural representation techniques were mainly derived from the artistic ones. In recent decades, especially thanks to digital technologies, architectural drawing has been expanding specific technical methods.

I, therefore, suggest to deepen these aspects and broaden the theme of architectural drawing techniques as a history of techno-culture inherent in representation. The history of the relationship between architectural drawing and techno-cultures, vital food for progress, is therefore another fundamental piece of the puzzle of the history of representation.

After all, it is possible to theorize the history of architecture through the evolution of representation techniques (Frampton, 1985).

In 1995 Bruno Zevi made a point about the new languages of architecture that in the early 90s were overcoming the postmodern (considered negatively by the historian).

He offers some interesting references: "*La nuova epoca è caratterizzata da un nuovo costume professionale, da nuovi strumenti progettuali.* […] *Non restano che gli atti creativi, le eccezioni alle regole.* […] *L'intero apparato delle convenzioni e delle abitudini risulta estirpato.* […] *I tavoli da disegno vanno al macero, perché quel disegno non serve più; giganteschi falò di righe a T, squadre, tecnigrafi, compassi liberano gli studi professionali. Si lavora con il computer che ignora la linea dritta, il parallelismo, l'angolo retto, l'uniformità e lo standard.* […] *La nuova architettura incarna la democrazia, giustizia e libertà, il liberalsocialismo con le sue contraddizioni, la sua cacofonia, la sua affabilità al caos*" (Zevi, 2018, p. 13).

Finally, still reflecting on the ease with which we can acquire (archive), generate (in the sense of 'drawing'), reproduce –metaphorically remember the command Ctrl + C (copy) and Ctrl + V (paste)– and communicate (in the sense of sharing) images (together with current intercultural tendencies, often dictated by globalization), and of the consequent 'conformative' risk (of thought), I recall here a consideration by Vittorio Gregotti: "*La circolazione poi di un'enorme quantità di immagini già nel XX secolo e, successivamente, il fenomeno del riciclaggio artistico delle immagini delle arti nella vita quotidiana ha anche posto il problema di ridefinire il rapporto tra produzione e riproduzione*" (Gregotti, 2008, p. 4).

A FIRST CONCLUSION: THE AUTONOMY OF THE IMAGE AS A DOCUMENT TO BE SAFEGUARDED

Only by stopping at these three key words (but this would not change if we if we would introduce others), it is evident that the meanings continually overlap and merge into a choral narration whose common denominator is all included in the well-known thought by Franco Purini: *Il disegno è l'idea* (Purini, 1992).

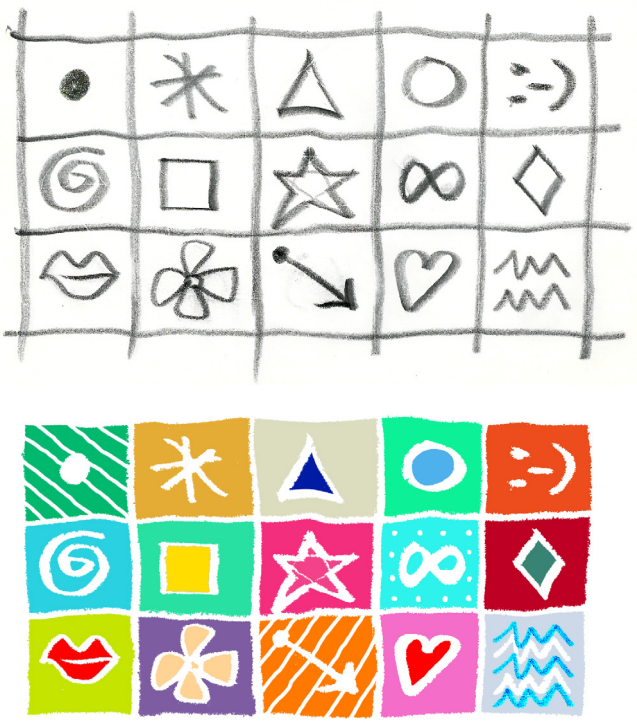

Fig. 1 Maurizio Unali, *How many mistakes are there in those images?*, 2019.

Once again, the role of drawing as a document is strengthened.

But in the post-digital era the phenomenon has to be updated by debating some concepts, such as the well-known theme of architectural drawing autonomy.

Re-reading some parts of my Ph.D. thesis from far-off 1994, focused on architectural drawing, I was able to remember how even in those 'pre-digital' years (at least for architecture) the theme aroused interest and stimulated hypotheses about its future, which we can verify today, triggering further critical cues to fuel the debate.

Let's start with a first statement: representation is a free form of expression of the intellect, it is the medium through which an author expresses his ideas, his personality, his culture, his time, his being an 'artist'. The author's images, then, are documents: what would be, for example, the projects for *Broadacre City* (1934) or *A mile-high skyscraper* (1956-1959) if Wright's drawings were not

still there today to testify and document (precisely) these futuristic ideas of architecture? Sometimes architecture 'only' drawn and not realized has still managed to impose its message and become a reference point for the evolution of architectural thought.

It is always the knowledge of the history of representation, therefore, the first interpretative link to activate empathic elaboration processes and overcome the difficulties that are found in the reading of a project image; complexities that also result from the multiple values inherent in representation, which correspond to as many possibilities of interpretation, categories of judgement, attributions of value and meaning.

The representation can, of course, be analyzed from several angles; it can be read for its artistic value, for its instrumental value (i.e. for the object represented), for its communicative value, etc.

It is precisely from this multiplicity of values that as many affirmations of the autonomy of representation derive: for its artistic value, for its being a 'work of art', for its content (design thinking form) or for its being 'containing'. These categories of evaluation (to which we can add many others) contribute to form a possible 'shared' aesthetic judgement on the image that becomes a testimonial, an artistic biography of the author's personality.

The authorial image will therefore always offer itself as a document of something that is also beyond the representation itself.

In the case of the architectural drawing, for example, the image can be read independently as 'containing', a more or less explicit, more or less resolved communication vehicle. The drawing will then offer itself as a subject, as a document of itself.

In this sense its language will be properly graphic language, of which the sense of the implicit messages, the meanings related to certain signs must be highlighted.

As Roberto de Rubertis states, the elaborative 'keys' through which we arrived at that drawing must be traced, because the same 'keys' will allow us to enter it again (de Rubertis, Soletti & Ugo, 1992); we must know the author's drawing world, his thought, his culture, his models, his references, his intentions.

That is, it is necessary to know the graphic language of the author observed, to know the cultural climate in which that drawing was born, to refer to the author's personality, and to refer to the intrinsic characteristics of that drawing (that is, the purpose for which it was produced which is in relation to what it intended to communicate explicitly).

Referring to the cultural climate means referring to the knowledge and theories of design, philosophy, science, art and construction techniques of the time, but also to geometric knowledge, methods and graphic techniques, investigating their influences and conditioning.

In this frame of reference the design is presented, offered as a document, a testimony for a better (or different, however, enriched) knowledge of the period to which it refers, in which it was born.

Referring to the author's personality means framing this reading within his biography and his operative practice. This analysis allows us to understand even more deeply his personality, his culture in rapport to his time, to understand, in essence, his being 'architect in history'.

Finally, to refer to the intrinsic characteristics of the drawing also means to evaluate the images according to the different typologies, the different purposes for which they have been elaborated. This last annotation on the architect's drawing types is of extreme importance for a correct reading of the image.

In the drawing, the genesis of the project remains clear and legible, from the first idea to the subsequent elaborations, they remain visible as 'superimposed stratifications' making the creative process decipherable as in the 'geological formations' (Magnago Lampugnani, 1982, p. 6).

It is up to us to trigger processes of historicization of images and to identify new creativities, to theorize new aesthetics, to critically elaborate the state of the art of the phenomenon, highlighting positive and negative aspects.

"*Chi può dire quanti artisti nasceranno nei prossimi venti minuti?*" (Cage, 1969, p. 22).

That's why, against the risk of the homologation of images and their conformative use, I hope more history of representation!

POST SCRIPTUM. FIFTY YEARS OF THEORETICAL REFERENCES

To remember the rich and detailed research on the history of representation (see the paragraph *More History of Representation!*), without the claim to reconstruct all the most important historical-critical works elaborated, I list some authors and events taken from my personal experience; general works, monographic and periodical publications, manuals, dictionaries, exhibitions, etc., which I consider 'certified' references.
Works on Geometria descrittiva are omitted –despite the importance of this discipline for the history of architectural representation– referring the reader to thematic bibliographies contained in Riccardo Migliari's books (see Additional readings).
Clear, therefore, that this complexity of historical knowledge is presented here (for editorial reasons) in the form of "vertigo of the list" –a conceptual reference freely taken from the title and contents of Umberto Eco's book Vertigine della lista (2009)–, appears the drawing of a map (work in progress) to stimulate debate, deepen research and trigger relapses in teaching.
Here, then, is my personal list:
the necessity of "Disegno Utile" and the *Manuale dell'architetto* drawn by Mario Ridolfi (1946); the *Storia del disegno* (1947) developed by Luigi Grassi and the entry "Disegno" written for"Enciclopedia Universale dell'Arte" (1986); *Il linguaggio degli architetti* described by Vittorio Ziino (1951); the original annotations of Maurizio Sacripanti on *Disegno puro e il Disegno nell'Architettura* (1953); studies on *Perspectiva artificialis* by Decio Gioseffi (1957); four works of Luigi Vagnetti, *Disegno e architettura* (1958), *Il linguaggio grafico dell'architetto oggi* (1965), *L'architetto nella storia di occidente*, (1973), *De naturali et artificiali perspectiva* (1979); the empathic draw of Gaspare De Fiore and three of his books, *Disegnare per conoscere* (1960), *Dizionario del disegno* (1967), *La figurazione dello spazio architettonico* (1967); searches of Cesare Brandi on *Segno e immagine* (1960) e *Struttura e architettura* (1967); the studies of Erwin Panofsky, *La prospettiva come "forma simbolica"* (1961), *Il significato delle arti visive* (1962), *Studi di iconologia* (1975); Ernesto Puppo and *Il disegno del progetto architettonico* (1961); the relationships between *Cultura e disegno* (1965) debated by Franco Borsi; *L'Eterno presente: le origini dell'arte* (1965) by Sigfried Giedion; by Ernest H. Gombrich, *Arte e illusione*, (1965); the prescient intuitions of Walter Benjamin in *L'opera d'arte nell'epoca della sua riproducibilità tecnica* (1966); two books of Giovanni Klaus Koenig, *L'invecchiamento dell'architettura moderna ed altre dodici note* (1967), *Architettura e comunicazione* (1974); among the works of Renato De Fusco I remember *Architettura come mass medium* (1967), *Il codice dell'architettura* (1968), *Il progetto d'architettura* (1984); *Disegno e progettazione* (1967) by Marcello Petrignani (e altri); among the many works compiled by Umberto Eco I remember *La struttura assente* (1968) and *Segno*, (1973); I point the entry *Disegno architettonico* in "Dizionario Enciclopedico di Architettura e Urbanistica" directed by Paolo Portoghesi (1968); by Roberto de Rubertis *Progetto e percezione* (1971), *Il disegno dell'architettura* (1994); by Attilio Marcolli, *Teoria del campo. Corso di educazione alla visione* (1971); by Adolf Loos, *Parole nel vuoto* (1972); by Manfredo Tafuri, *Progetto e uto-*

pia, (1973), *La sfera e il labirinto* (1980); by Piero Sartogo, *Il metodo virtuale* (1974); by Silvana Macchioni, *Il disegno nell'arte italiana* (1975); by Carlo Mezzetti (et al), *Il disegno. Analisi di un linguaggio* (1975); by Vittorio Gregotti, *Il territorio dell'architettura* (1977), *Scale della rappresentazione* (1984); by Bruno Munari, *Fantasia* (1977), *Prima del disegno* (1996); by Fernando Gil, *Rappresentazione* (1978); by Bruno Reichlin, *L'assonometria come progetto* (1979); by Giorgio Muratore, *Disegno, immagine, progetto* (1979); by Pierre-Alain Crosset, *Il principio del fuoco* (1982); by Jacques Guillerme, *La figurazione in architettura* (1982); a fundamental research coordinated by Vittorio Magnago Lampugnani published in two works, *La realtà dell'immagine. Disegni di architettura nel ventesimo secolo* (1982), *L'avventura delle idee nell'architettura 1750-1980* (1985); by Manfredo Massironi, *Vedere con il disegno* (1982); by Sergio Musmeci, Carlo La Torre, *Disegno architettonico esecutivo* (1982); by Helen Powell, David Leatherbaroww, *Masterpieces of architectural drawing* (1982); among the many fundamental theoretical contributions elaborated by Franco Purini I point *Il fattore D* (1982) and *Il disegno è l'idea* (1990); then I recommend reading the monographic issue of "Rassegna" entitled *Rappresentazioni* (1982); among the many international works developed by Massimo Scolari I remember *La questione del disegno* (1982), *Elementi per una storia dell'axonometria* (1984), *Progetto e immagine d'architettura* (1984), *Teorie e metodi del disegno* (1994); some "classics" of Italian Draw education, Mario Docci, *Disegno e analisi architettonica* (1983), *Manuale di disegno architettonico* (1985), *Disegno e analisi grafica* (1987); by Emilio Montessori, *Disegno ed espressione progettuale* (1983); the cyberpunk atmospheres of the novels of William Gibson and the representation of "Cyberspace" described in *Neuromancer* (1984); by Gianni Contessi, *Architetti-pittori e pittori architetti, da Giotto all'età contemporanea* (1985); by Piero Albisinni, *La città ideale nei disegni di Leonardo Savioli* (1986); by Robin Evans, *Traduzioni dal disegno all'edificio* (1986); by Louis Marin, *Le vie della carta* (1986); I recommend reading two monographic issues of "XY, dimensioni del disegno", *Rappresentazione* (1986) e *1968-1988 Vent'anni di architettura disegnata* (1989); by Jorge Sainz, *Teoria e storia del disegno d'architettura: una questione di stile* (1987); by Roberto Masiero, *Il vasaio e l'ingegnere: lineamenti per la disciplina del Rilievo* (1989); by Francesco Moschini, *Il disegno tra utopia e teoria: le linee portanti della ricerca* (1989); by Margherita De Simone, *Disegno rilievo progetto* (1990); by Alessandro Anselmi, *Disegno di architettura e architettura disegnata* (1990); Michael Benedikt e la rappresentazione del Ciberspazio, *Cyberspace. Primi passi nella realtà virtuale* (1991); by Roberto de Rubertis, Adriana Soletti & Vittorio Ugo (eds.), *Temi e Codici del disegno d'architettura* (1992); by Mario Docci, Diego Maestri, *Storia del rilevamento architettonico e urbano* (1993); among the fundamental researches elaborated by Tomás Maldonado, *Reale e virtuale* (1993); by Manlio Brusatin, *Storia delle linee* (1993), *Storia delle immagini* (1995); by Livio Sacchi, *L'idea di rappresentazione* (1994); by Alida Moltedo and Paolina La Franca, *Disegni di architetture. Schizzi e studi di opere romane dal dopoguerra agli anni ottanta* (1995); finally, another fundamental text is *City of Bits* (1995) by William J. Mitchell, published in Italian by Sergio Polano in 1997.

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MEMORIA E ASSENZA. LA CASA DI FAMIGLIA IN DUE *GRAPHIC NOVEL* AUTOBIOGRAFICHE

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Introduzione

Il grande interesse del mondo della cultura nei confronti del fumetto ha radici lontane nel tempo e, sebbene inizialmente sia stata considerata una espressione artistica dedicata prevalentemente all'infanzia, nel corso di tutto il secolo scorso questo linguaggio grafico si è evoluto ed è stato definitivamente riabilitato durante il fermento culturale degli anni sessanta del secolo scorso. Grazie a contributi come quello di Umberto Eco con il suo *Apocalittici e integrati* (Eco, 1964), è stato elevato a strumento di letteratura di massa, rendendolo da allora in poi, categoria oggetto di studio accademico e modificando per sempre la percezione di pubblico e critica che, inizialmente, gli aveva negato la legittimità intellettuale che aveva destinato ad altri media altrettanto popolari (Lus Arana, 2013b).

E oggi, senza entrare nello specifico degli studi scientifici che collocano all'interno della categoria dei testi iconici narrativi le strisce, i fumetti e le *graphic novel* (Romero-Jódar, 2013), possiamo finalmente affermare che dopo anni di polemiche e intenso lavoro intellettuale, il fumetto nella sua accezione più generale ha raggiunto lo status di arte. Anzi, rispetto ad un passato anche piuttosto recente, e probabilmente a causa della profonda crisi dell'editoria, il fumetto sta diventando sempre più un prodotto culturale di nicchia (Cassarà & D'Urso, 2013). Eppure, nonostante questo evidente dato di fatto assistiamo ancora a dibattiti legati alla legittimità di genere letterario delle *graphic novel* rispetto ai fumetti (Priarone, 2019).

Nell'ambito di questo contributo si abbraccia esclusivamente l'ipotesi che il *graphic novel* non è altro che un momento di riappropriazione da parte del fumetto di una prerogativa narrativa e letteraria che gli era naturalmente congenita (Brandigi, 2013). Inoltre, la consapevolezza che autori *ante litteram* di fumetti come Töpffer parlassero in modo naturale di letteratura disegnata prima ancora che il fumetto stesso esistesse, annulla di fatto il problema dei generi e della gerarchia tra fumetto e *graphic novel* e tra parola e immagine (Brandigi, 2013).

Analogamente a quanto è accaduto con altre forme d'arte, i continui scambi e le relazioni tra fumetto e architettura non sono fenomeni recenti. Le pubblicazioni di architettura degli ultimi trent'anni mostrano infatti una produzione costante di articoli e un numero crescente di mostre che confermano le numerose sovrapposizioni tra architettura e narrativa grafica (Lus Arana, 2013a). Al di là del suo aspetto essenziale, il fumetto ha sempre affascinato gli architetti con la sua capacità unica di riunire comunicazione, spazio e movimento (Lus Arana, 2013a). E infatti, l'interesse attuale per i fumetti da parte degli architetti si fa risalire al 1925, con lo *storyboard* di Le Corbusier nella *Lettre à Madame Meyer*, in cui l'architetto svizzero illustra al cliente i suoi concetti di design per la mai costruita Ville Meyer attraverso una serie di panorami sequenziali della casa (Lus Arana, 2013a). Il disegno sequenziale trova infatti la sua naturale applicazione nella rappresentazione dell'architettura, dimostrando la sua efficacia nelle fasi di concettualizzazione e sviluppo del design come anche nelle fasi di comunicazione del progetto (Bagnolo & Lusso, 2019). In tal senso è emblematico il contributo di Ingels che nel suo archicomic *Yes is more* (Ingels, 2011) è contemporaneamente narratore e personaggio principale in una specie di conversazione in forma grafica nella quale si rivolge direttamente al lettore spiegando i dettagli dei suoi progetti attraverso quattrocento pagine di fotografie, diagrammi, rendering e altre immagini racchiuse in pannelli e condite con didascalie e palloncini (Lus Arana, 2013a). Tuttavia, la strategia comunicativa utilizzata da Ingels non è poi così dissimile da quella utilizzata da Le Corbusier con il suo cliente. In questo caso specifico possiamo concludere che il fumetto è stato adattato agli obiettivi dell'architetto e questo giustifica il motivo per cui l'autore usa il termine *archicomic* per differenziare il suo libro dai fumetti convenzionali (Pascoal, 2015).

Edifici e fumetti: similitudini e rimandi

Molti studiosi, in particolare giovani, si sono occupati di indagare il rapporto tra architettura e fumetti. Tra i lavori più interessanti, nati spesso come tesi di laurea o di dottorato nelle facoltà di architettura, spiccano quelli di Andrea Alberghini (2006), di James Benedict Brown (2007) e, tra i più recenti, quelli di Michela De Domenico (2013) e dello spagnolo Lus Arana (2013a, 2013b, 2019). Tuttavia, la maggior parte di questi studi si è soffermata principalmente su un particolare aspetto della relazione tra le due discipline: quello legato alla rappresentazione degli ambienti urbani nei fumetti. Il rapporto tra città e fumetti è denso di significati, si presta a molteplici letture e viene costantemente incrementato dalla incessante produzione di fumetti a tema, inaugurata nel 1982 con la serie *Les Cités Obscures* di François Schuiten e Benoît Peeters. Il tema principale di quest'opera è la critica dell'utopia effettuata attraverso immaginarie città fantastiche originate da gemelli reali, mentre vi sono esempi più recenti e aderenti al reale come gli omaggi a Venezia di Taniguchi (2017) e di Fior (2019, 2020) o ad esempio gli innumerevoli ritratti di Berlino di Alberto Madrigal (Trizio, 2020). Un aspetto probabilmente più marginale, sebbene altrettanto interessante, del rapporto tra le due discipline è quello che si sviluppa alla scala del singolo edificio. E infatti, proprio secondo lo stesso Benoît Peeters (2013) nella loro impostazione anche formale i fumetti propongono dei piccoli mondi realizzati a una scala gradevole, immagini situate in uno spazio familiare, che è possibile tenere sotto controllo e dominare. Per Peeters lo stesso spazio della pagina è, a sua volta, analogo allo spazio del fabbricato con i suoi piani, i suoi corridoi, le sue scale (Peeters, 2013). Anche per la studiosa Chaterine Labio esiste un inconscio architettonico nell'organizzazione della pagina dei fumetti che aumenta significativamente la loro capacità di lettura, il potere emotivo e la popolarità del genere. Per la Labio i formati delle pagine, diversi nei differenti paesi, corrispondono alle forme base e ai fronti degli edifici residenziali nei loro luoghi di origine e pertanto la pagina evoca sempre, automaticamente, il *meme* di casa ed è sempre già familiare al lettore (Labio, 2015). Questa analogia tra la struttura formale dell'edificio e la pagina del fumetto probabilmente è stata intuita dal francese Bertall già nel 1845. Questi infatti organizza una tavola in vignette che fa coincidere con la sezione strutturale di un edificio parigino, nelle cui stanze si svolgono scene di vita di numerosi personaggi (De Domenico, 2016). Essendo un antesignano del fumetto, questo lavoro non utilizza la lettura sequenziale delle immagini che si acquisirà solo successivamente, ma l'idea è vincente, e infatti viene ampliata e ripresa da Chris Ware nel suo *Building Stories* (Ware, 2012). Analogamente a Bertall, Ware rappresenta un vecchio edificio di Chicago nel quale, all'interno dei singoli appartamenti si svolgono le molteplici vicende dei suoi personaggi. Ware utilizza le tecniche di rappresentazione proprie dell'architettura e intreccia assonometrie, sezioni, prospetti, dettagli tecnici alla composizione classica della tavola a fumetti (De Domenico, 2016).

In generale, quindi, nella sua forma più ovvia la struttura convenzionale della pagina dei fumetti, con le strisce sovrapposte, richiama alla mente tanto le sezioni trasversali quanto le facciate di edifici a più piani e quindi non solo la pagina conserva le tracce del suo archetipo architettonico, ma favorisce il lavoro della memoria. Queste immagini infatti generalmente ci ricordano la natura primordiale del nostro rapporto con gli edifici, in genere quelli familiari che sono legati al nostro io attuale e alla nostra infanzia che lo ha generato. La ricorrente ricerca della casa d'infanzia, sia essa reale o immaginaria, è una caratteristica del lavoro della memoria compiuto dai fumetti che giustifica una grande quantità di lavori autobiografici prodotti dai fumettisti negli ultimi decenni (Labio, 2015). Proprio quest'ultimo aspetto, della ricerca della memoria a cui i fumetti sembrano particolarmente adatti, è quello che si intende approfondire in questo contributo. Nei prossimi paragrafi verranno infatti analizzate due *graphic novel* autobiografiche per le quali è centrale il ruolo della memoria nel racconto in forma grafica della casa di famiglia e per le quali è altrettanto centrale il vuoto lasciato in entrambe dalla scomparsa della figura paterna, compensata dalla materialità dell'edificio stesso, la casa, che assurge spontaneamente a protagonista della storia.

La *Fun Home* di Alison Bechdel

Nel 2006 viene pubblicato il *graphic novel* autobiografico di Alison Bechdel dal titolo *Fun Home. Una tragicommedia familiare* (Bechdel, 2007), volume che nel 2007 vince il premio Eisner come migliore

opera basata su fatti reali ed è, probabilmente, la graphic novel più discussa dai tempi di *Maus* di Art Spiegelman (Kashtan, 2013). La Fun Home del titolo si riferisce, utilizzando un ironico gioco di parole, non tanto alla divertente casa di famiglia quanto alla contrazione delle parole che compongono il termine *funeral-home*, l'attività che il padre dell'autrice, insegnante di inglese in un liceo, porta avanti part time.

Protagonista assoluta di questa *graphic novel* è, evidentemente, la casa dei Bechdel: il grande edificio vittoriano che il padre dell'autrice restaura ossessivamente con costanza e dedizione per circa diciotto anni è polisemico e soprattutto rappresenta il punto di incontro tra memoria e identità. Infatti, attraverso l'atto di memoria volontario che l'autrice compie attraverso la realizzazione di *Fun Home*, emerge tutto il carattere poetico e creativo della casa (Labio, 2015) che ha avuto un ruolo fondamentale nella costruzione dell'individuo che l'autrice è diventata. Il maniacale lavoro di restauro portato avanti da Bruce Bechdel, gay latente e amante dell'architettura in stile e dell'interior design, tradisce in maniera evidente la ferma ostinazione di negare e reprimere la propia omosessualità e la volontà di lavorare costantemente non solo alla costruzione della casa, ma anche a quella dell'immagine di famiglia pefetta. *Fun Home* mostra Bruce Bechdel intento nel rinnovamento incessante della propria casa allo stesso modo in cui cerca di reprimere i fantasmi dei propri desideri. La relazione tra il desiderio di ordine e pulizia e il contenimento di desideri e paure private è ancora molto presente nella cultura popolare contemporanea. Ne è infatti un'ampia dimostrazione il fenomeno in base al quale si stanno diffondendo sempre più programmi televisivi nei quali vengono ristrutturate abitazioni, che indica come la metamorfosi della casa rappresenti ancora oggi, per la nostra società, la miracolosa trasformazione del disordine in ordine e chiarezza (Lydenberg, 2012). E la necessità di traformare il disordine in ordine è altrettanto evidente in *Fun Home*: l'eterosessualità che Bruce Bechdel cerca di manifestare attraverso la cura maniacale delle apparenze si intreccia ad un modello idealizzato di identità di classe a cui egli aspira ardentememente, ed entrambi sono incarnati dalla sua stessa casa (Lydenberg, 2012). Come genitore Bruce Bechdel è altrettanto incapace: non riesce a stabilire un rapporto emotivo e fisico con i propri figli ed è completamente paralizzato dalla paura di mostrare i propri orientamenti sessuali che cerca invece di dissimulare attraverso la sua continua opera. Egli è allo stesso tempo vittima e artefice della propria messa in scena (Gennero, 2009) che si chiuderà con la sua prematura morte che avverrà poche settimane dopo il *coming out* di sua figlia.

Attraverso un lavoro di memoria altrettanto meticoloso quanto quello di suo padre nel recupero della propria casa, l'autrice nella ricostruzione del loro rapporto riesce a mettere in evidenza come tutto l'apparato scenico costruito dal padre faccia parte di una strategia globale di occultamento e rimozione (Gennero, 2009). Nella storia narrata dalla Bechdel finzione e realtà si mescolano continuamente e la compita famiglia cattolica schierata in prima fila alla messa domenicale non esiste veramente, ed è lontanissima da quella ritratta nella foto d'epoca che mostra gli originali abitanti all'esterno della loro nuova casa in stile neogotico che riflette contemporaneamente la loro posizione di classe e la loro tradizionale famiglia nucleare (Lydenberg, 2012). Le foto di famiglia messe in scena da Bruce Bechdel sono invece costruite con cura per suggerire un'unità familiare e una normalità altrettanto uniforme ma poco aderente alla realtà. E infatti Bruce Bechdel viene ritratto dalla figlia sempre in attività, in pantaloncini corti, ma l'immagine di uomo virile che restituisce in realtà è molto distante da quella dello stereotipo rappresentato dai suoi vicini di casa, e dai rozzi cacciatori che popolano la cittadina di provincia. In pratica Bruce e i Bechdel sono al tempo stesso un'impostura e una vera famiglia (Gennero, 2009) e il filo rosso che li unisce e contemporaneamente li divide è proprio la casa che abitano. Tra le continue contraddizioni messe in luce all'interno di questa *graphic novel* c'è la presenza fortissima del padre che con la sua personalità complessa schiaccia quelle degli altri abitanti, presenza che stride rispetto all'evidente assenza della figura materna, completamente annullata dal *pater familias*. Nonostante la sua presenza la figlia lo sente come assente da sempre, concentrato nei suoi sforzi di mascherare la propria natura, di ristrutturare la casa, che lo alienano di fatto dalla famiglia. Questa continua confusione di presenza e assenza si verifica nelle rappresentazioni visive dello spazio domestico, dove i membri della famiglia sono spesso mostrati in

stretta vicinanza fisica ma emotivamente estraniati. Bechdel utilizza ingegnosamente l'architettura della casa familiare, vista dall'esterno, per rafforzare l'isolamento che ha caratterizzato la vita nella casa di famiglia (Lydenberg, 2012). Inoltre, se la casa familiare è un personaggio fondamentale in questo libro di memorie, la biblioteca di Bruce è il cuore di questo personaggio e, nel mezzo di una vita domestica piena di tensione, la passione per i libri offre ai membri della famiglia momenti di tregua. L'amore condiviso per i libri, inoltre, consente a padre e figlia di raggiungere momenti di connessione. La casa in generale e la biblioteca in particolare li legano insieme e la natura fragile e duplice della loro relazione trova un punto d'incontro nella rispettiva omosessualità. In una memorabile scena del libro padre e figlia sono ritratti insieme in biblioteca, ma attraverso un artificio grafico è la struttura stessa della casa a separarli e infatti la figlia è vista attraverso una finestra che scrive o disegna mentre attraverso un'altra viene mostrato il padre intento a leggere (Labio, 2016). Gli stessi contenuti della biblioteca hanno avuto un ruolo fondamentale nella generazione della coscienza dell'autrice, e nella progettazione di questo libro, in particolare opere come la *Recherche* di Proust, e infatti la casa e i libri rappresentano, rispettivamente, per l'autore e suo padre, la chiave per ricordare e per creare (Labio, 2015). E così, se il padre rimane intrappolato all'interno della costruzione che ha faticosamente realizzato a sua immagine e somiglianza, senza accettarsi mai veramente, Alison attraverso *Fun Home* finalmente se ne libera. La tragedia di Bruce Bechdel, del quale non si conoscerà mai la vera ragione della morte, se suicidio o incidente, rappresenta un omaggio dell'autrice al sacrificio di tanti uomini e donne schiacciati dal peso dell'omofobia. Parallelamente rappresenta per la figlia un'ispirazione a rimanere fedele a sé stessa e a quel desiderio di realizzarsi che il padre aveva cercato disperatamente e inutilmente di rimuovere (Gennero, 2009).

La scena finale del libro ci porta così al di fuori dei confini fisici ed emotivi della casa che per Alison bambina rappresentava un pericoloso labirinto, in una piscina all'aperto dove la donna adulta, oramai liberata e sicura di sè, fa compiere alla bambina, fiduciosa, un tuffo tra le braccia di suo padre, compiendo allo stesso tempo un salto di fiducia oltre la sicurezza delle cose e delle identità costruite rigidamente (Lydenberg, 2012) lasciando finalmente il posto anche alla nostalgia che l'assenza genera.

La casa di Paco Roca

A circa dieci anni dalla pubblicazione di Fun Home viene pubblicato in Italia *La casa* dello spagnolo Paco Roca (2016). Come la precedente, anche questa è una *graphic novel* autobiografica dal sapore fortemente proustiano, ma il contesto emotivo, sociale e culturale tra le due opere è completamente differente. Ne *La casa* non siamo più nella provincia americana degli anni settanta ma nella Spagna della transizione post franchista e molto diverso è il background delle due famiglie. La differenza di classe tra la famiglia raccontata da Alison Bechdel, fatta di intellettuali della classe media e quella narrata da Paco Roca, che ha origini operaie, è sostanziale e probabilmente è anche alla base delle complicate implicazioni psicologiche della prima rispetto al clima più sereno o forse semplicemente meno consapevole che si respira nella seconda. A dispetto però delle evidenti differenze, tutti e due gli autori affidano alla memoria un compito sostanziale che è quello di comprendere il proprio essere attuale attraverso la rilettura delle storie personali effettuata con gli occhi del ricordo. Paco Roca non è nuovo all'uso della memoria nei fumetti, come ha brillantemente dimostrato nel suo *graphic novel* precedente, *Rughe*, che narra la storia di un uomo anziano malato di Alzheimer (Roca, 2013) i cui i ricordi vengono disperatamente tenuti insieme con tutte le proprie forze prima che la malattia prenda il sopravvento sradicandone pezzo a pezzo la memoria (Bellu, 2016).

La storia alla base di questo lavoro di Paco Roca è molto semplice e inizia con la letterale uscita di scena di Antonio, l'uomo che rappresenta il padre dell'autore, che esce di casa durante la prima pagina per non farvi più ritorno. Ad un anno dalla morte di quest'uomo i suoi tre figli, di cui uno, José, è l'alter ego del fumettista, tornano nella casa con l'intenzione di rimetterla a posto in vista di una futura possibile vendita. Spostando gli oggetti accumulati, esplorando le stanze, muovendosi senza sosta tra il giardino e il garage i tre regalano alla casa, ma soprattutto a sé stessi, una nuova possibilità (Corno, 2016). A differenza di quella dei Bechdel la casa di Paco Roca non è quella di famiglia ma è la casa delle vacanze,

anche in questo caso costruita dal padre pezzo per pezzo durante le lunghe estati con l'aiuto dei suoi tre figli. Per Antonio la costruzione di una casa per le vacanze, perseguita ossessivamente, rappresenta soprattutto il tentativo di avvicinarsi, almeno all'apparenza, a un certo status sociale. E, se per Bruce Bechdel la ristrutturazione della casa, per la quale pretende la manodopera dei figli, ha delle implicazioni emotivamente forti, per Antonio rappresenta esclusivamente il guadagnarsi il proprio spazio nel mondo: mettendo i figli al lavoro Antonio plasma lo spazio intorno a sé e lo addomestica, rendendolo quindi parte della famiglia (Corno, 2016).

Mentre per i Bechdel la casa rappresenta un legame solo formale tra i suoi abitanti, per i tre figli di Antonio la costruzione che li ha coinvolti anche materialmente nella loro infanzia, anche se imposta dal padre, ha, di fatto, creato un legame tra loro, e, in occasione del recupero dell'edificio, questo legame riaffiora e si ritrovano nuovamente come famiglia. I tre figli inizieranno i lavori di ristrutturazione prima singolarmente, per poi incontrarsi e confrontarsi, mettendo in evidenza le caratteristiche differenti dei tre personaggi e il loro rapporto con il padre. Tramite i ricordi dei tre figli viene tratteggiata l'identità del padre, uomo semplice e schivo, in una scoperta continua, dell'uomo e della sua casa, forse entrambi da rivalutare (Costanzo, 2016) e forse conosciuti da tutti solo superficialmente. Anche in questa *graphic novel*, come in *Fun Home*, quella del restauro della casa è una metafora che sottintende un lavoro costante sulla costruzione di sé che l'autore compie in questo viaggio nella memoria che viene lasciata scorrere nella sua irruenza, con le sue piccole e grandi tensioni, incomprensioni, ma anche tenerezze e spensieratezze (Bellu, 2016). In questo fumetto sono numerosi i frammenti narrativi che colpiscono per la loro forza emozionale come anche i *flashback* che si sciolgono in vari episodi: da quello delle Olimpiadi viste con la tv posta sul cofano di un'auto, al bagno in un bidone di fortuna, a una firma sul muro dopo averlo costruito (Bellu, 2016). Dal punto di vista puramente tecnico, mentre *Fun Home* è monocromatica, scelta che evidenzia la drammaticità della storia, e che consente di concentrare l'attenzione sui personaggi, nel fumetto di Paco Roca il ruolo dei colori è fondamentale. E infatti il salto temporale tra presente e passato, come anche i cambiamenti delle stagioni o dello stato d'animo dei personaggi si realizza attraverso gli evidenti cambi cromatici delle vignette. Anche il formato scelto da Paco Roca non è casuale: contrariamente a tutti i suoi lavori precedenti, questo fumetto ha uno sviluppo orizzontale. Un aspetto che rende familiare al lettore la storia perché la forma è quella di un vecchio album di foto di famiglia, dove le vignette si susseguono come tante immagini che segnano i momenti importanti della vita di un gruppo di persone unite da un legame di sangue e d'affetto (Giai Via, 2016). La forza di questo racconto, se paragonato alla complessità del precedente che invece è decisamente molto soggettivo e intimista, risiede nel suo essere un racconto universale, tanto realistico da essere reale. La casa diventa un luogo di ricongiungimento per ciascuno di noi, una testimonianza della nostra storia, tanto da fondere le sue fondamenta con le nostre radici (Costanzo, 2016). E alla fine non è poi così importante per il lettore sapere se alla fine la casa verrà venduta o rimarrà ai figli per poter custodire con essa il ricordo del padre. Quello che è importante è aver ristabilito l'esistenza di un legame profondo da chi ha condiviso in essa dei momenti e ne conserva il ricordo.

Conclusioni

Secondo Sattler, i fumettisti sono pienamente consapevoli di come i fumetti possano essere facilmente dimenticati, e quindi affrontano il tema della "memoria" come un trofeo centrale per discutere di come funziona il loro mezzo, non solo sulla pagina ma anche nella mente dei lettori (Sattler, 2010). In queste due opere, entrambe gli autori mostrano di essere pienamente consapevoli di quanto per loro sia fondamentale questo argomento. Sia in *Fun Home* che ne *La casa*, il tema della memoria è centrale, e ruota intorno a quello della casa, ma se per Paco Roca la memoria è identità, e in particolare sostiene che è la forma stessa attraverso cui è possibile definire la propria identità personale (D'angelo et al., 2017), per Alison Bechdel la memoria diventa una possibilità di liberazione e di affermazione della propria identità. Oltre questo, ciò che accomuna questi due lavori è la caratterizzazione che entrambe gli autori fanno degli stati d'animo dei personaggi, ma anche la cura estrema dei dettagli dell'arredamento e della fisionomia dell'edificio stesso, particolari che trasformano la casa in un essere

vivente, testimone di gioie e dolori, di ansie e di desideri repressi, che porta i segni delle esistenze che l'hanno attraversato (Martinolli, 2016), dettagli che le conferiscono un'identità precisa e la rendono protagonista (Costanzo, 2016). L'assenza delle due figure paterne è compensata quindi dalla presenza materiale dei due edifici fortemente desiderati da entrambi, sebbene per motivi differenti e che, di fatto, li sostituiscono. In definitiva, gli ingredienti di queste due storie sono i padri, i figli e le case che, con i loro oggetti e con la loro puntuale e meticolosa descrizione che ne fanno i figli divengono personaggi principali sostituendosi ai loro stessi artefici, grandi assenti di queste storie. Come ammette lo stesso Roca il vero protagonista di questa storia è la casa stessa, come contenitore dei ricordi e come simbolo del padre (Canessa, 2016).

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