EL ARQUITECTO, DE LA TRADICIÓN AL SIGLO XXI

Tomo II

EL ARQUITECTO, DE LA TRADICIÓN AL SIGLO XXI

Docencia e investigación en expresión gráfica arquitectónica

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Re-drawing architecture for exploring the design. From research to teaching and vice versa

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Abstract: Re-draw architectures as heuristic practice aims to explore the motives, the conception, and the formal and technologic choices, understand the relationship with the original and current context, the transformations, from concept to realization and during the life.

In the research the practice of re-drawing, is involving the author along with a group of Master's candidates, with the contribution of historical disciplines, on case studies relating to Twentieth century demolished, altered or 'on paper' architectures.

In the teaching, a version of this activity, adapted to the students' training in the Laboratory of Drawing and Survey, has been proposed, also with input from some lectures by architectural design professors.

Keywords: Drawing and Design. Research. Teaching.

Introduction

"... for designing a building you need a wealth of ideas, conceptual structural and formal, which has to be acquired by other architects, ancient and modern (...) And there is no chance to get a 'language system', in architecture, if you do not analyze drawings and photographs of the chosen subject, draw everything, proper trace (...) After all it is a reversed path, than the design" (Quaroni [1987] 1995, 17).

Re-drawing architecture is an activity of cognitive, interpretative and creative meaning that have involved, since the last century, scholars, teachers and students of Architecture in Italy.

The manual activity to which Quaroni above refers, offers some advantages, especially from a pedagogical point of view, allowing students to face the scale drawing, assess the level of detail of the different drawings and replay by choosing lines, thickness and graphics, between the standards ones, but also to offer personal interpretations gleaning from different tools and techniques of representation.

Conversely the digital tools offer the possibility of a more rapid three-dimensional recomposition with respect to the traditional re-drawing, especially when modelling regards the interior and exterior, even allowing, depending on software chosen for the work, to derive the technical design drawings from the sections of the model.

In addition, the digital modelling enables to enter the fourth dimension, allowing original and new explorations of the created models and also to create physical models and prototypes of the object in question. The time dimension may also be useful for simulating different phases of construction and transformative as well as to decompose and recompose the analyzed artefacts.

The digital world offers then, even in this ambit, new and additional possibilities for analysis and interpretation, with the ability to generate synthesis models that collect the information gained and represent them in the form of two-dimensional technical drawings, 3D models, digital animations and prototypes digitally manufactured.

Depending on the different stages of the design under consideration that, in the research described below may range from those that remained on paper, those realized, altered or even demolished, vary the basic materials available to scholars: archival drawings and writings, plastic models, vintage photographs, contemporary reviews, historical surveys, with regard to the

initial life of the project, as well as urban / territorial maps and current surveys regarding today conditions of the building and the context in which it stands.

Also the re-drawing intents may be different, oriented also on the available sources: reconstruction can relate to the design drawn, or its different versions, or that built with the different transformations, but also the choice of the time when imagine the reconstruction, can vary depending on the different possible interpretations.

The possibilities above outlined have been personally explored in the research and the teaching and are applied in the case studies below developed.

Re-draw to discover: the research

In the research the practice of re-drawing is involving the author along with a group of degree candidates, and the contribution of Contemporary Architectural History scholars, on case studies relating to twentieth century architectures, demolished, altered or remaining on paper or on individual analyses of the work of some contemporary masters (Spallone 2015a, Spallone 2015b).

Kahn's unbuilt masterworks are the subject of a research involving the author with some bachelor candidates.

Among these, the U.S. Consulate in Luanda (1959-'62) and the full configuration of Salk Institute in San Diego, California (1959-'65), were modelled respectively by Marco Andrea Tancredi and Alessio Alberti.

The design of U.S. Consulate proposes the incorporation of unglazed, independent forms borrowed from the ruins of the ancient world, which Kahn saw during his stay in Rome, into a very modernist architecture.

In the building Kahn addresses the problems of climate by developing two design themes: the ruins wrapped around buildings and the separated roofs for the sun and the rain.

Tancredi chose to display the model, mainly in parallel projections, with the aim to highlight the correspondence between the two buildings, the internal distribution, the structural system and the performance of the vertical diaphragms (the ruins) and horizontal (double roof) with respect to the climatic conditions. The roof plan of the whole shows correspondence in size, alignment and roof perforations to the sun and the rain; cutaways and exploded isometrics show functional partitions and load-bearing supports; the setting of shadows shows the solar behaviour. The application of photorealistic materials and lighting to perspective scenes in which there are also daily life elements offers possible foreseeing of artefacts and spaces designed by Kahn.

The Salk Institute for Biological Studies along the Pacific, in the vision of the founder Jonas Salk, would have to be a place where artists and humanist could inform and inspire those working on the frontiers of science. The architectural complex designed by Kahn included the laboratories, the meeting house and the houses for the fellows, but only the first one was built.

The theme of ruins as devices to control glare appears also here as three-dimensional, complete forms that define and enclose space. Indeed, fully exterior and independent cylindrical ruins wrap around cubic inhabitable space, and cubic ruins wrap around cylindrical inhabited space.

Alberti in his thesis aimed to represent Kahn's project in its context as if it had been entirely built.

The relationship with an environment strongly characterized from the dry rocky slope overlooking the sea, the spatial articulation of the three architectural units and the careful choice of materials, are Kahn's design themes, which inform the choices of representing the model of the complex inserted in the environment as if it was a plastic model. The terrain has been shaped by extrusion of the contour lines giving the environment a degree of abstraction comparable to that of the artefacts. Even the colour attributed to all the natural elements through the application of a material that evokes the cork allows distinguishing them from the buildings clay rendered.

The final product of the representation is a 7 minutes video, which allows to dynamically exploring the three units thanks to fly and walk through. Only a few still images in photo-realistic rendering with fast fading effect can evoke a perceptual effect generated by materials and real lights.

Another study carried out by the author and Bruno jr., concerns the utilization of digital techniques of representation to adopt new strategies for the preservation

of the architectural heritage and its memory (Spallone, Bruno jr. 2013). The experience, conducted with some bachelor candidates, regards the application of computer technology for the virtual reconstruction of some minor architectures realized in Turin during the Thirties on charge of the Fascist Party, today deliberately lost due to their symbolic means. The reconstructive operations start with a precise analysis of the graphic documentation stored in archives, a research of the original pictures and a survey on the building materials utilized at that time. After this first step of data collection, the digital reconstructive process begins, regarding the building itself and the surrounding context. The interaction among different scientific disciplines, such as history of architecture, representation and also material technology will guarantee the experiment a higher scientific level.

One of the case studies analyzed, the Casa del Marinaretto, built in the Thirties and demolished without any consideration in the early sixties shows such original and interesting design solutions, that the preservation of its authentic memory and its valorisation seem justified.

The Casa del Marinaretto was designed by Costantino Costantini close to the river Po, looking like a big 'urban anchored ship' of huge impact. In the sixties has been demolished to permit the building of some not valued architectures, cancelling the memory of a high quality architectural product with international inspiration. The work moves after the rigorous analysis of the original drawings preserved in the Turin archive and proposes the reconstruction of this building according to its original version as it was drawn by the architect for the first time, and so in a different manner respect to the built result. This process guarantees also the 3D perception, the authenticity of the materials and of the location into the urban context, using digital static and dynamic rendering systems. The 3D model of Costantini's project, inserted into the urban and natural context of our days, to simulate the perceptive effects that the building could express today if it was still standing, was made by Francesco Carota.

The model, realized using 3D computer graphics and animations programs, is the basis for the production of a video-clip that explores the relationship between the actual image of Turin and the Casa del Marinaretto and describes, with the synthetic language of the movie technique, the original shapes and the emotional reactions, the same as it was real.

Another line of research concerns several buildings of Carlo Mollino, whose archive of drawings is preserved in the library of Architecture at the Politecnico di Torino, and characterizes a series of theses, conducted in collaboration with Sergio Pace. The subjects, until now studied are the Turin Horse-Racing Society Building, demolished in 1960, two 'ideal houses' respectively published on the magazines Domus (1942), and Stile (1944), and the competition design for the Palazzo del Lavoro in Turin (1960), unrealized because not winning.

The Horse-Racing, an early and acclaimed work by Mollino was short-lived (from 1937 to 1960). Its demolition was connected with the wider process of urban transformation, which involved the area along the west bank of the river Po, triggered by the celebration of the Unification centenary of Italy.

The digital reconstruction of the building has been realized by Florida Canaj during her master thesis.

She also analyzed the relationships between the building and the context, less dense than the current, but strongly characterized by different buildings, reconstructed by means of archival city maps and design drawings.

The Horse-Racing has been reconstructed in detail, once identified those archive drawings that allowed the most faithful reproduction of reality, after filling in the missing information and resolving ambiguities and inconsistencies of the documents. In this sense, the re-drawing of the project takes on the meaning of a true re-design that requires a deep understanding of the artefact and poetics of the architect.

The modelling phase has been carried out by the technique of 'blueprint', arranging plans and elevations on orthogonal planes so as to foster the most appropriate control of the process.

The model has been lightened with sunlight while, about the materials, the opaque surfaces are rendered using clay and those transparent with glass. In this way the model maintains the proper level of abstraction and avoids generating the sense of fake that characterizes the photorealistic reconstructions. The choice to represent the perspective views of the model in black and white goes to the same aim, allowing also a comparison with the vintage photographs taken under the guidance of the same Mollino.

Further processing, which aims to compare the digital model renderings with the original photomontages, and to search the same view points and solar illumination conditions, has been lead to try a new photomontage of the model in the portrayed old context.

The Casa sulla collina (1943) and Casa sull'altura (1944) are two ideal houses by Carlo Mollino, digitally reconstructed by the master candidate Antonio Laudani.

The issue of 'ideal houses' animated the Italian architectural debate, during the period of forced inactivity due to the II World War, so that several architectural magazines became promoters of the initiative to request and publish projects of the contemporary top architects on this subject.

In both case studies, the publication of drawings was accompanied by Mollino's writings to the editors, which described the concept, his reasons and widens the speech stating his position with respect to contemporary architectural debate.

Carlo Mollino was an architect who combined the research of architectural quality to a strong knowledge and experience of building (Pace 2006, 120), because he had worked, from the beginning and for about twenty years, with his father Eugenio, an engineer, particularly productive especially in Turin area.

The relationship between the drawing and the constructive reality emerges also in Mollino's designs programmatically intended to remain on paper, of which also the technological details in large scale are graphically defined, the interior furnishings are designed as an integral part of the architecture and, even, the static schemes of some structural elements are traced.

The particularity of Mollino's modus operandi, which was expressed, for each project, through hundreds of drawings, led me to propose the student to use a parametric three-dimensional modeller like BIM, aimed to the three-dimensional reconstruction, in order to assess the three-dimensional consistency of the two-dimensional archival drawings, checking possible variants and obtaining sections from the 3D model, provided with the graphic standards of architectural technical drawing and settable at different scales, selected also in order to compare them to the sources.

The reconstruction was completed by a video and a plastic model digitally fabricated: a demountable material model, made with a small 3D printer which extrudes fibres of polylactic acid.

Through these operations, for the first time, the design is freed from the two-dimensional support, through the transformation in three-dimensional digital model (though always accessible through the two-dimensional space of the screen), achieves the fourth dimension by the production of the video that allows to visit, offering new views, and finally truth imbued in a three-dimensional material object.

In addition, through some Mollino's drawings, which place the Casa in collina in relationship to the centre of Turin, it was possible to hypothesize its location, imagined by the architect on Monte dei Cappuccini, near the XVII century church. The photo-montage of 3D model in the current environment highlights a shocking antagonistic relationship between the house and the church for the conquest of the hill-top.

An additional and different direction took the research that led Giulia Bertola, a bachelor candidate with undeniable artistic sensibility, who, starting from the personal interpretative drawings, realized with different techniques, of architects and designers such as Ettore Sottsass, Gaetano Pesce, Massimo Scolari, Alessandro Mendini, chose to dwell her analysis not on the 'visible' elements, but on the 'hidden' elements, linked to the thought of each designer by analyzing what conducts the architect to make use of different techniques to express his own 'idea'.

The occasion on which her hypothesis were tested was offered by an architectural competition, the IBA 84 for Berlin, meeting place of three masters as Aldo Rossi, Peter Eisenman and Rem Koolhaas, with their different poetics and design approaches. For exploring their proposals, Bertola has dept studied writings and drawings of the three, constantly accompanying her discoveries with drawings, collages and notes on her cahier and arriving to a synthetic graphic work which interprets the competition proposals for IBA.

Re-draw to learn: the teaching

In teaching, a version of the re-drawing is proposed, adapted to the students' training in the Laboratory of

Drawing and Survey in the first year of Architecture at Politecnico di Torino.

The work is conducted on realized works of contemporary masters, starting from the published projects and leads to an exploration of the architects' poetics, through the reading of his writings, the consultation of critic texts on their work, the navigation in their website and then deepen the knowledge of an assigned design through analysis of the context in which it is placed, conducted with the traditional cartography and web map services, and the comparison between the iconographic material found to better understand the distributive, the technological and the materials choices.

The analyses lead to the production of two plates containing 2D and 3D drawings which synthesize the knowledge phase and a short animation and flow into the first practice of the Atelier of Composition and Urban planning, with the production of a plastic model of the building.

Afterwards the scientific assumptions and the educational consequences of these activities are documented.

The exercise of re-drawing is offered to students whose previous training in the secondary schools not necessarily involves the learning of architectural drawing and tools of computer graphics representation into their curricula. The teaching of architectural drawing standards, starting from the representation methods, and in particular of the orthographic projections in their technical form applied to architecture, and the specific graphic symbols are therefore preparatory to such activities. The setting of proper and efficient systems of CAD drawing and modelling, including render, animation and post-production procedures, becomes also necessary, through the application of specific software.

Re-drawing a project using as sources the materials published in magazines and books makes to face with representations, mostly redrawn for the editorial homogeneity needs, generally incomplete and responsive to the graphic standards other than those used in professional practice, while images abound. In contemporary publications, the general trend, in fact, is to reduce the number of drawings and their scale, often not indicated, and to apply a graphic minimalism over the use of conventional symbols, which often makes rather laborious the drawings comprehension, the interpretation of the missing parts and the three-dimensional reconstruction of the building. In return renderings and photographs, sometimes indistinguishable one from each other, increase, while the autograph drawings, illustrative of the concept, are often absent.

Even the contextualization of the object through site plan, that explains the environmental integration and formal choices, only sometimes is published and must be sought through other instruments, such as web map services.

After the assignation of a specific project, the students are invited to construct their own path of discovery of the artefact that involves the reading the architect's writings, literary criticism and journalism, his personal website. They are also encouraged to conduct virtual explorations through visualizations in aerial and street view mode and collect photographs and videos available on the web.

The buildings chosen by the teacher have in common to be single-family houses built in the Western world from the modern movement to date, and they are published as objects worthy of note, with the recognition of contemporary criticism.

During setting of work the teachers of Architectural Design, that follow the same students in the next Design Studio, are invited to offer their personal analyses about some of the relevant projects, according to their specific disciplinary perspective.

The proposed work is conducted in small groups of two or three persons with the purpose of teaching students a conscious division of work and sharing responsibility: each student must be able to respond to the teacher's observations about the group work.

The drawings are composed in two plates of A1 format with a layout provided by the teacher.

The re-drawing consists of a real transcription, with a high content of abstraction: the process starts from the recognition of each sign, as part of the built that has a three-dimensional and material consistency, and arrives to another type of sign, which responds to the codified language of the architectural drawing. Each line in the iconographic sources must therefore be read, recognized, interpreted and then traced.

The representation of the materials in the two-dimensional drawing of elevations involves the individual

research of those iconic graphics that evoke particular textures realized, making unusable the hatches offered by the software.

The integration between the different sources –drawings of plants, elevations, sections, axonometry and perspectives, with photographs, renderings, videos– facilitates the understanding not only the shapes and materials, but also the paths and ways of use of the spaces. It is a time of great educational value, generally for the first time; the student has to recompose and synthesize information of different nature, facing to the representation of his cognitive path regarding architecture and its environment.

Interesting considerations may arise from the comparison between the original context, documented by vintage photographs, and the current one, that students are asked to represent. The older architectures, in fact, seem sometimes to have drawn some of the reasons for their conformation to environmental conditions no longer present as a result of the urban and infrastructural development. Even the projects themselves may have been subject to changes, or when running or after. All these variants must be carefully recorded by students, and compared with the present situation.

Once made the two-dimensional representation, through a site plan in scale 1:500, plans, elevations and sections, in scale 1: 100, i.e. the scale of the final project drawing, the three-dimensional geometric modelling, including interiors, always using CAD tools, is proposed. As known, there are no coded standards about the relationship between scale and content of the 3D model that tends to simplify the object using geometric primitives, because the complexity of the work. Furthermore, the possibility of generating animations, with move to and away from the object, makes the choice particularly delicate. In the actual practice, modelling the building including openings, balconies, roofs, interior walls, stairs and any other distinguishing features, is required. The terrain is created by solid modelling starting from the contour lines; the surrounding buildings are reduced to geometric primitives while the trees require special attention. In order to make lighter the files, the real trees are contoured and slightly extruded and then copied and rotated 90° so as to allow a three-dimensional display. Isometric views, bird and human's eye perspective of this model, displayed in hidden line as the traditional technical drawings, are set. Generic materials are then applied: clay for all the opaque surfaces and glass for the transparent ones, setting the different lighting conditions, from solar light through which solar studies on the site plan during the solstices, to the artificial ones generating night views.

The choice to represent only the opacity and transparency, avoiding the application of materials and patterns offered by the software, responds to the teacher's will to make appreciating the geometric and spatial qualities, and lighting effects of the modelled buildings, keeping them deliberately in a conceptual sphere flatly distinguishable from real buildings.

The model is also presented in exploded and cutaways views that accentuate the conceptual meaning. Particular attention is paid to the comparison between the photographs of the building and rendering made through research of the same shots.

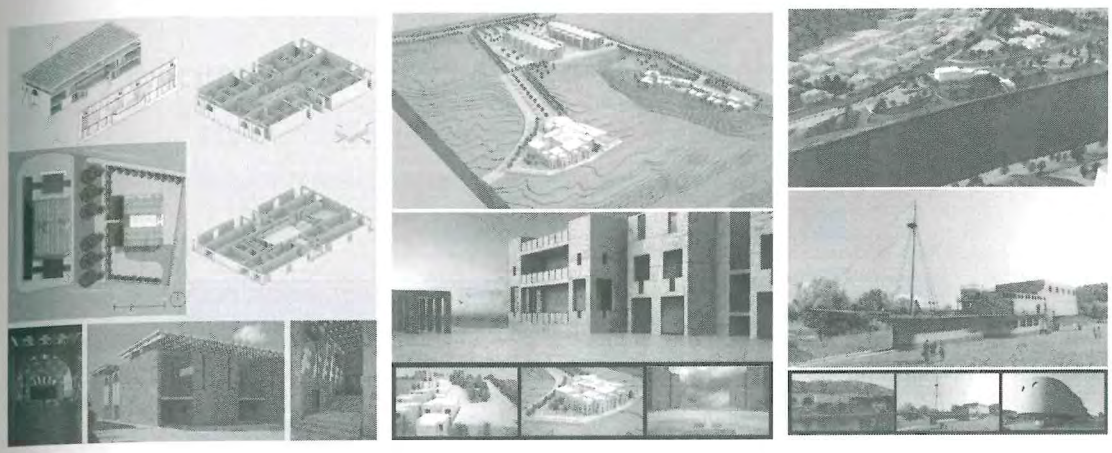
A short animation, constituted by a path around and inside the building, finally allows simulating a virtual tour of the building, verifying the perceptive effects.

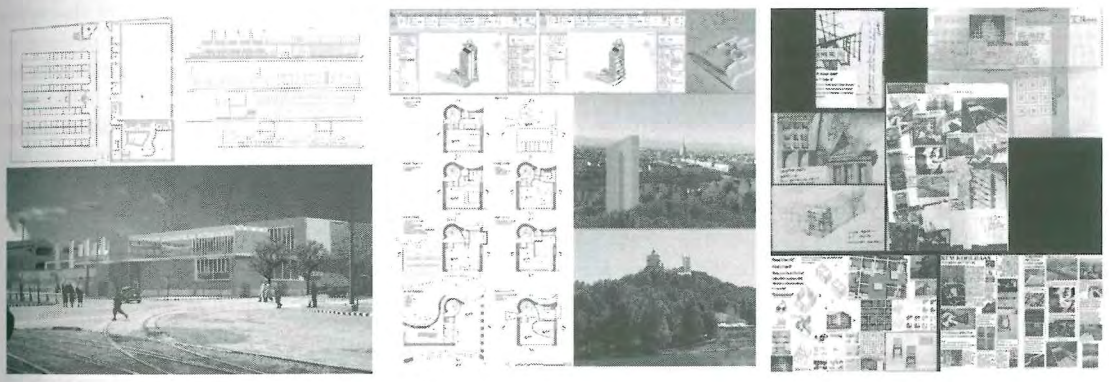
The plastic model, which constitutes the first practice of the Design Studio, ideally ends the cognitive experience with a material object, generally realized in sheets of poly-plat, an easily workable material that allows the construction of a non-mimetic, openable and decomposable plastic.

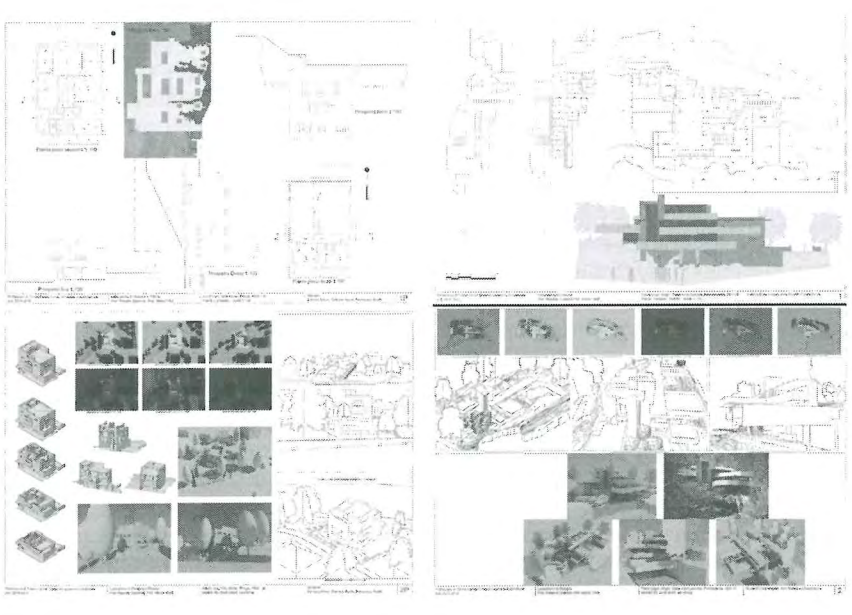
Conclusions

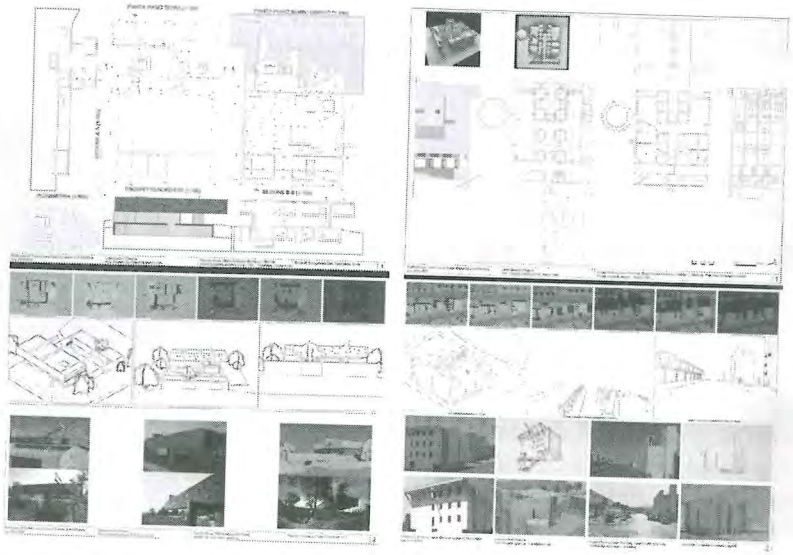
In the considerations and case studies above developed two different approaches emerge about the re-drawing of the design intended as a heuristic practice.

In the teaching, in fact, the knowledge moment is privileged and the use of representation tools, strongly conformed, is aimed to the acquisition of the architectural drawing conventional language and to its use for expressing the cognitive process accomplished, in the research the interpretive moment prevails, in particular based on deep analysis of the masters' poetics taken into account, and on the putting in relation the texts and drawings. The choice of the adapt tools to express these interpretations then becomes part of the interpretation itself: it cannot be unique and draws from the sensibilities of the one who has to re-draw, that performs an operation of real re-design with his work.









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