Learning from Volume Processing

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We will expose a kind of chosen curriculum about the activities we have been working on, basically at the Politechnical University of Barcelona. Vallés School of Architecture. Our activities, in the realm of Apple Macintosh, involve undergraduate students and a Master degree as well.

The way we use graphic computers and 3D software has been formulated gradually through a continuous and progressive use. Dedicating work with Apple Macintosh computers doesn't concern to teaching drawing programmes, but we try to "normalize" its use. How? Integrating it in different tasks and suggesting its use in a range of programmes. And, sometimes, letting the visual transcriptions suggest new arguments. The visual system of values developed by the Modernists (now history) and through the mass media, especially photography, cinema, video, are, nowadays, part of our visual language. We must use this to facilitate the comprehension of an argument, to discover the inherent values of an architectural organization, to hold and manipulate the virtual illusion derived from the pencil work-.To anticipate the life of a building, to enlarge, to expand or simulate the architectural experience. In fact the virtual modelling of a building, which has not been built, or a group of them, increases the relation with historical studies, because it helps better, and in a more precise way. It gains specific weight in the realm of critical & historical analysis. It's precisely in this area of knowledge where we work at school. The Department is named Composition. A devaluated term. And although it seems a play on words, we consider that the programmes own -architecture", especially the three dimensional drawing ones. invite us indirectly to think about certain formulations and values of the architecture, or at least suggest it.

Certainly, this is not the place to explain the working abilities of the Mac, but 1 think 1 have to say that the most of our work is based on this.

The use of certain programmes, especially those ones which process volumes, refer back to the 1918 tendencies. 1 mean, to the Foundations of Modern Art. Thus a step forward, paradoxically, relates to the earlier break-through in architecture.

In fact, we start off our activities working only with two dimensional drawing programmes. The very brief period, when we dealt with them, was enough to infer most of our future decisions.

Let us see:

First degree of the simulation. When drawing axonometrical views with two-dimensional tools. [1] Nevertheless, dealing with an original document, and only one menu order, several documents could be obtained. We saved most of them, it seemed a shame to put them into the waste paper basket. We grouped and nominated the different sets for various concepts. Thus, documents collected before vanishing could be used to enhance some of the categories of the architecture of the fifties, as they were "the only practical space", or the resonances of Dutch "plasticism", or the activities facing maintenance and hygiene, the idea (scheme) of a back to back laminated building as Gropius enaunced, the way to reach the void, and so on... A simultaneous understanding was grasped economically on one screen. We called it the "new technical reproductibility".

- This work concerned the Architectural Credo for the fifthies, in housing problems.

- A new building for our School of Architecture. [2]

Meanwhile our school decided to move into a new building. When the project was ready, we had been entrusted by the staff to draft some perspectives, to complete the presentation of the model and the whole project for the press. We did more.

We also prepared a small "Hypercard"@, and a "VideoWorks"@ to show some inner or outer walks, to show details of the skylight, and to explain the way we understood how the school would grow as a structure. By

the way, we called this "neither flesh nor skin".

Journalists could choose voluntary positions in the future school and each of them had their particular point of view. The chosen situations varied among the hall, the library, and the corridor, but one of the journalist asked for the view from the loo. We painted the drawing also with "Studio 8", as we did with the others. [3]

When the journalists left the presentation, they could pick up more than an impression, an imprint, because we plotted the chosen views for them. There we got the idea that this kind of procedures actually anticipate the life of a building.

MULTIMEDIA DISCOVERING

Dynamic iconography can be the way to facilitate reading critical and analytical architectural texts. Its systematization in Hypercard@ could mean a new way of reading. Most of the time, articles need visual help to be read, views and plans are required. But they are not often easily available, due to their relative place in the book or the main text. Thus, we suggested our students to illustrate, by a kind of "dynamic iconografy", an article or other similar studies.

The starting point is to summarize the article. Once done it. we can choose from the ideas, and knowing that we can call upon images, fuse them. By movement and other manipulation, we expose simultaneously the new facilities and the subject refered to. We believe that this kind of work, that implies a deep comprehension by the illustrator, provides a better, faster and simpler understanding to other students. This material can be used by others, reinforced, or extended by other students in the future. That's especially appropriate when the arguments are structured by oppositions, or comparative analysis. The new arrangement introduced through the visual documents always allows a clearer reading of the text without modifying the order of the discourse.

- "Lutyen's Architecture Restudied"

A small sequence of the whole dynamic illustration -it concerns to an article published in A.R. by Allan Greenberg in 1969,

Its title, "Lutyen's Architecture Restudied", could he understood as a challenge for us in the sense that, with our computers, we can restudy not only Lutyen's Architecture but Greenberg's analysis of it.

In his essay there is a number of provocative ideas which are difficult to grasp. Dynamic iconography not only makes these ideas accessible but it allows to use them actively. They can he developed to the extent that even Greenberg's analysis can be criticized.

This work is not concerned with reconstructing or simulating the domestic architecture of Sir Edwin Landseer Lutyens but with restudying his drawings with the arguments of Greenberg's text.

In Little Thakeham, there is an almost symmetrical disposition of rooms within a square or a symmetrical H plan. By introducing a mould form, a counter form, we can show the shape. [4] The pergola, as a garden element. is also an element of the whole composition. The two main axes can he used to relate the superimposed plans of the groundfloor and the first floor. As Greenberg argues, the crossing of the main axes is occupied by a solid mass.

The axial conflict between the main axes and the inner ones can he seen in the hall, where the inner axis of the piece should be understood only by the position of the fireplace and door to the corridor, which merely trisects the north wall of the hall. Neither reading dominates, nor constantly attention oscillates between both.

The juxtaposition of axes at different scales can be better understood from an internal view. But if an axis is an unidimensional reference on a plan, in a view, it should he seen as a geometrical plane. [5] Thus we have either of the two systems in conflict.

First, there is the main transversal axis, which also corresponds to the inner system of the piece, and the main vertical one. Last but not least, the inner axis which is being determined by the balcony and the fireplace.

Whatever view we choose, we will find the same conflict between the inner axes of the piece and the main axes of the whole. Each axis is fixed by ensembles of different kinds of elements which, at the same time, define the walls.

But also the elements operate ambiguously as a kind of furniture. While the fireplace and balcony above have their double on the west side wall, the bay window and the stairs could be understood either as interior objects or as extensions of the space.

Superimposed on this plan and symmetrical system of axes is an independent and circumambulatory circulation pattern. The solid mass, at the crossing, dislocates movement from the axes, and separates guests and servants on either side of itself.

Although the entrance door is on the main axis, movement is deflected off axis. This could be understood as an arbitrary question of style but, if the main transversal axis is lost in the wall of the corridor, the circulation articulates a sequence of spaces, where a variation of the volumetric quantity of space could be simultaneously registered on both plans.

Some of the schemes derived from the principle of compelling movement either on, or off an axis, axial complexities, are almost always used to articulate transitional areas and are related to particular circumstances in each plan, or in each transformation in the menu order. [6]

- On CERDA'S first unknown hitherto plan.

The "betaversion" (1.0) (or original documents) of the Cerda's plan for Barcelona were recently discovered. A student from our School rescued them from the archives. What he found was a kind of balance of the knowledge about the city and the housing in the middle of the last century. These papers, perfectly indexed. about 500 manuscript folios, exposes in a very precise way what was for Cerda the ideal city house. And the plans of the different models of housing are combined with their disposition over blocks and squares. Our virtual construction of these houses was a successful attempt in classical language simulation. The courts, and the inner spaces of the working class housing surprised us due to its extreme rationality. Especially the communitary houses, which look like some of the propositions from the extinct italian "tendenza". [7] The views we simulated concerned also the combinations of models proposed in the main project, forming blocks of detached houses or ranges of terraced houses. [8] Streets have been formed by the simple repetition of the models. But at a certain point of the simulation (the work we had done) we were more devoted in relating it to the text, than to determine exactly the architecture in all its details. We created (generated) views to enlight the seminal subject of the inner court in the house, both for lighting and the renewal of the "air mass". [9] We also created views to show how Cerda could establish the homologous relationship from the secondary rooms to the main one, and to the court, and to the unbuilt space between houses. When we gave up working on this virtual model construction, we arranged a "Supercard"@, testing

how from the text, images could he called upon, and viceversa. There is still a lot to do in this way, because the text is a manuscript, and must he transcribed carefully. At the same time, generating (creating) views is a long process which also involves coloring.

- Le Corbusier's "House for an Artisan".

The house for an artisan was a project never done by Le Corbusier. The aim of this work was to simulate a set of interior views manipulating its internal geography. The most determinating elements of the interior were moved into three different positions. The entrance door, the balcony and the stair, in their respective new positions, configures such different impressions to the viewer depending on the already taken point of view. [10] Now, it is time to redraw the plan. In fact, it is already done. Next exercise would be writing something about the way these new projects could not be accepted by the author.

- On volume processing

MacArchitrion@ as a three dimensional software is thought to manage the whole project until the estimation of cost. We believe that this must not be its job in a school of architecture. Thus we use it to explore in the realm of the history of architecture. Most of the works, (exercises) we have been doing, dealt with Modernist "Avantgardes", basically for their structural affinity with the strategy this software follows. As a Volume Processor it makes you deal only with solids, with mass. The void, I mean, the relationship between the boundaries of the mass items, is obtained by default. Whatever solid you want to obtain must be previously reduced, by an intellectual abstraction, to prismatic items which section at first is a parallelogram. It is very easy to infer that architecture undergo to its de-naturalization. Not even further than when it holded-up the principles of the Dutch Elementarism. It didn't matter if they were pilliers, columns or beams, because they were solid items. Otherwise, if their use force such a reduction, we believe students must profit it, in their own interest, to study back the principles of Modern Movement in such a different way, more practice, more experimental. And maybe it increases the understanding of the Modern Movement concepts in an exponential way. Testing not only software to represent their own projects but representing other architectures to test their own knowledge.

- On ADOLF LOOS

As much a determining factor in his architectural experience as the cladding is: the height of the rooms; the furniture which is built into recesses in the walls, and the way of entering with its close attention to privacy. The height in "Raumplan" is a very precise question of two decimal points but in the computer it is even more precise. In our opinion, the best way to handle this precision is to maintain the space in a way that it can be constantly monitored. For the students, to virtually construct the "Raumplan" houses means the possibility of continuously testing the plan and section, for the gradient of privacy which is established by the -Raumdurchdringung- or strategy of interpenetrating pieces.

Simulating, by obtaining interior views [11], the spatial experience of a "visit", especially when the project has never been built, presupposes bravery, always with respect, but without any doubt if we initiate such a process we will eventually have, for the first time, a complete set of plans. A comparative measurement of the different versions of the plans for each house, which have been published, can produce new projects, and therefore new simulations.

It is well known that Adolf Loos did not like to draw plans. He did not think the medium was precise enough. Most of his "Raumplan" houses do not have reliable drawings because he used to modify them during construction. Less well known is his thought that, "the day when chess will be played in three dimensions will be the moment when the architect will plan directly in the space. [12]

Tectonics does not play any role in his architecture.

Honesty in construction didn't mean anything for him. What really concerned him was the mass, the solid, in an static balance or not, all the rest is space. MacArchitrion works this way.

Now we could even say that Raumplan means also a kind of "three-dimensional cartography-.

- VAN DOESBURG 1923

Kontro-Konstruktion. Counter-construction. We said there is a structural affinity between a Volume Processor and the way which Modernists (avantgardes) had expressed themselves. Eventhough, as an abstract idea, Neoplasticism, latter Elementarism, only came to be expressed by axonometry. This was considered as a two dimensional expression, controlled by the principle of the permanent opposition. Some of the Neoplastic purposes are still seminal nowadays.

We can re-live the experience (in color) (remember that functionalist didn't have this chance because b/w photography) of the real counterbalanced relationship of lines and planes. We can realise that there is no vertical or horizontal dominants. Counter-construction in a certain point of view is nothing but an antistatic painting. [13]

Three of these unsettled counter -composition models, had been in constant movement since they where exhibited for the first time in Paris in 1923. Nowadays, they appear as a phase of work and of plastic thought which can be, and must be, explained after the event. No-one doubts that it represents a way of thinking. Nevertheless, an explanation, "a posteriori", can reinforce this vision. Opposed to the classical, it is an [11] abstract- notion of composition and plastic expression. It is also opposed to the fact that, fundamental standard elements of nature and architecture are predominant everywhere. In fact, abstraction is precisely what takes place within the boundaries of individual thought. Thus, to conceive the three dimensional space as defined by the faces which involve it, rather than mass, suggests that it could be viewed in two ways, spatial or plastic. Among others, the "tools" for the very conspicuous situation are the virtual alignment between voids and solids. All the surfaces are equivalent, and their masses lose meaning, the only significance is that of the lines. The walls start to seem cardboard. Their corporeality has left. Rasmussen offered advise on this theme in 1926, and Bruno Reichlin called it -de-naturalization". Otherwise axonometric was instantaneously static, a rigid composition, isolated within the boundaries of the plane. More abstract than painting, the virtual building by a Volume Processor, as a new mental behaviour, represents, nowadays the same reluctance of the institutional iconographical corpus, as Elementarism did in the twenties. Seventy years later, axonometry is the easiest way to obtain an utilitarian drawing view. With a discreet quantity of them (about 1000) the counter-construction reaches its birthday in entire freedom. Living without the hindrance of gravitation the object becomes the subject through the multiple points of view we choose. Actually it has won its own right to do without gravitation.

- On Frank Lloyd Wright's standarization matter.

In F.L. Wright's work there was a geometric premise rather than personal spatial insight (intuition). Among his writings some authors detected how he argues that if the plan is a solution, the elevation must he considered as an expression. Maybe, this sentence guided our subconscious for dealing with our exercises. One of the topics of his architecture is the very characteristic intersection of square and cruciform translated into three dimensions. Another one is: The first principle of any growth is that the thing grown, won't be mere aggregation.

Authors as Manson, McCornae and others, referred that in the Froebel's patterns the parts have surrended their identity to the whole. On the tartan (1 mean the kilt, the Scottish skirt) we can always read basically

the form of the plan. It is possible to abstract a perfect tartan from most of the Prairie houses. In most of these houses -Prairie houses specially-, the shape of the predominant figure is the form of across within a cross. Thus, a typical pattern consists of two interpenetrating cruciforms breaking through a square. The grid underlies the little Barton house of 1903. The plan is composed of crosses, one within another. The organization is revealed frontally as a succession of layers standing one behind another. [14]

The only way to explore the relationship between the inner and the outer, is to associate, step by step, the couples, or the series of pilliers, balconies, chimneys, verandas and many other prismatic elements. That is because its constituents provide a substructure corresponding with the dimensions of adjacent spaces. That was one of the ways Wright used to establish an interdependence of interior structure and external shape.

A very consistent structural discipline lays on this grid. Their elements, 1 mean the typical items in Prairie houses, as the main piers of the porch, and the exterior walls represent the outer figure. Likewise, the baywindow, the flower boxes and the extended veranda represent the inner components, submitted also as rigidly to the pattern.

For F.LL. Wright this was a basic recognition; parts added, porches, verandahs and balconies, should not he sensed as additional but should seem intrinsic, as extension of inner structure.

The position of extreme pieces suggest that the main volume of the building stands within the grid, rather than around it. The meaning of his thought concerns the harmonious relationship between plan and elevation, but they also reveal how he took into consideration the perceptual difference between seeing the whole pattern from above and grasping the overall form of a building from its perimeter.

Certainly, we must not forget that the screen of a computer can always be used as a grid. The best way could be to speak about the aid the kindergartener could be provided with, such was the table-top ruled with a grid.

The discipline of a grid, combined with modular components, is not only a Wright's educational affaire. Even Durand, at the end of the XVII1th century, provided his pupils of the "Ecole Polytechnique" with an array of abstract room-shapes, which could be arranged on squared paper, to make ideal symmetrical designs.

This is the only discipline which could engender, the complementary practice to remove the servitudes, and leave the strength to he transformed into powerful competitiveness. Will power alone is not enough to plan, nor to draw, or implement thorough 3D programs. The need of certain analytic practices, concerning the anatomy of Wright's Aesthetic, could represent to the future user a kind of given discipline, such as the T-square was.

This will always remain with us, as a mental capacity, one of the strongest structural disciplines in the history of architecture, and we surely start to associate this strategy with the Volume Processor.

- DEALING ONLY WITH EFECTS

The virtual modelling of a "model" is not a very useful entrusting. In fact the model was stolen. Thus the virtual modelling concerned more the strategy in which the original model was built than in the main building. We could offer more visual effects than the main model, as it was night time, the shadows, the clouds and the movement. [15]

LAST BUT NOT LEAST.

For Cezanne, the virtual space was the habitat of his mind. He was gifted in such a way that attentive watch and spatial composition were the same thing. Leonardo da Vinci was only able to see what he transferred to the canvas or drawn with the help of the transparent glass. He used to create primary illusion, space appearance. We would like to guide the way that is between Leonardo and Cezanne.

With a very long step forward in time we can end this lecture with a quotation from Theo Van Doesburg in his "From intuition towards certitude" wrote in Paris in 1930.---7bat which to-day bestows a cultural value on painting is mathematical or, rather, arithmetical control. Mathematics has represented not only the basis of all science but also the foundations of art during the great epochs. As soon as the artist uses elementary forms as means of expression, his work is merely 'modern', but universal---.

* LECTURE DONE AT JESUS COLLEGE, MARTIN SCHOOL OF ARCHITECTURE. UNIVERSITY OF CAMBRIDGE. SEPTEMBER, the 11th 1990.

[Notes]

1 "existenz minimun- in 1960. Barcelona. Apartment house, J.F. Barba Corsini.

2 "Neither flesh nor skin". New School of Architecture in Sant Cugat. El Vallés, Barcelona.

3 View from the loo. New School of Architecture in Sant Cugat. El Vallés, Barcelona.

4 Little Thakeham, Sir Edwin Lutyens. General plan.

5 Little Thakeham, Sir Edwin Lutyens. Interior view of the main axis of the Hall.

6 LCircumamblatory circulation pattern in Little Thakeham, Sir Edwin Lutyens.

7 Workers house. View from the court. Ildf. Cerdá, 1855.

8 Second class particular house. Semidetached. Ildf. Cerdá, 1855

9 Light and air court in first class houses. Ildf. Cerdá. 1855

10 Interior view of a virtual Le Corbusier's "House for an artisan".

11 Dice house. (1929), Adolf Loos.

12 Moller House (1928). virtual analytical design. Adolf Loos.

13 "Hotel particulier" Theo van Doesburg & Cor van Eesteren.

14 "Little Barton house (1903). Plan on Froebel's patterns.

15 Jean Nouvel's Tokio Opera Theater. 1989.