LEA Laboratoire d'Expérimentation Architecturale
Laboratory of Architectural Experimentation
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LEARNING FROM THE FULL-SCALE LABORATORY

Our team from the LEA at Lausanne was not actually involved in the construction of the laboratory itself. During the past five years we have been discovering the qualities and limitations of the lab step by step through the experiments we performed. The method in which we use it is quite different from that of its creators.

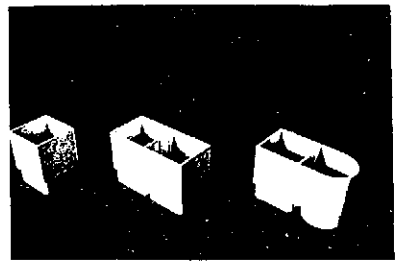
Since 1985 the external services has been limited to clients coming to the laboratory alone. We help them only with basic instructions for the use of the equipment. Most of these experiments are motivated by the excellent possibilities to discuss the design of a new hospital or home for elderly with the people directly affected by it, such as patients, nurses, doctors and specialists for the technical equipment. The main issues discussed in these meetings are of the dimensions and fonctional organisation of the spaces. The entire process for a normal room including construction, discussions and dismantling of the full-scale model is between three and five days. Today these types of experiments are occupying the lab only about twenty days a year.

According to a decision by the Departement of Architecture the majority of the activities in the laboratory are to be devoted to the education of future architects. Since 1985 the team has been developing didactic exercises for first and second year students in architecture. For a limited group of first year students, the laboratory is used to give them an introduction into architectural themes during the first three months of their studies. For the second year students short exercises (6-8 days) are developed in relation with their work in the design-studio. We would like to present to you some problems and conclusions discovered while working with the students in the lab and also some thoughts about this particular equipment in the Lausanne laboratory in relation to these didactic experiments.

The first question we had to answer was simple: What type of exercises would be appropriate to the full-scale laboratory? However this simple question was not an easy one to aswer. Quickly we discovered that we had to renounce all exercises of simulation: a well-done experiment of simulation was in fact too long and often too limited by the conditions of time, materials, dimensions, orientations, possibilities of views and natural light inside the lab. The effort required was too great and uneasily justified by the uncertain value of the didactic

experiment. Well organized visits to building sites and existing buildings could be a much better impact on the understanding of the material birth and presence of a building.

What was the important difference between a real building and a full-scale model in the lab? In any case the materials in the lab cannot simulate the reality of other materials. We first had to accept some particular qualities of the blocks and the other materials created specially for the laboratory (fig. 1 and 2): light elements offering the same facility of association and dissociation, suggesting an idea of continuous transformation. Some critics stated that this fundamental difference between the labs material for experimentation and any other materials employed for real buildings would prevent establishing relations between the exercises inside the laboratory and an architectural reality outside.



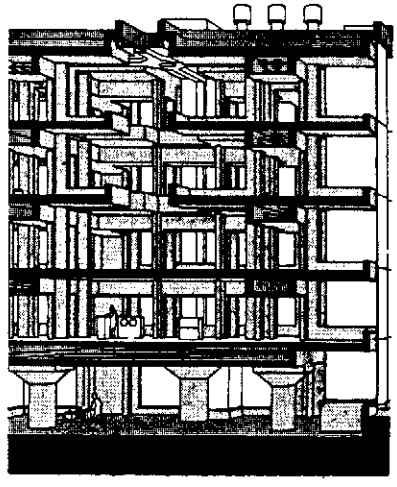
1 **The light blocks of the LEA construction system**

So, if we didn't believe that it could become a copy of a real building then how did we have to employ the full-scale model? In the design-studio we constantly use drawings as our main-tool. Rarely do we question ourselves about the relationship between this type of representation and the reality of the building which could be constructed after these drawings. It is common knowledge that one drawing is not an adequate representation of a building. To understand a building we

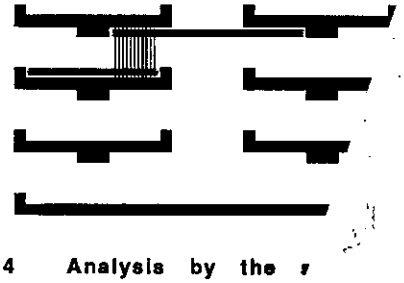
2 **A play of association and dissociation**

need a multitude of drawings. But even after disposing of a book of drawings we still would't know all the aspects of the projected or studied building. To know more we have to use other types of representations, models for example. The full-scale model could be another type of representation. One that allows you to think and to discuss certain architectural themes much easier. We tried to formulate the themes which could be understood much better by a full-scale model than by other types of representation.

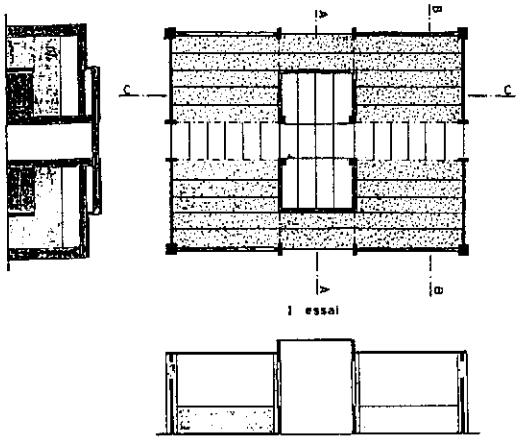
Hertzberger for example is using a rather simple principal in the design of the Central Beheer, his well-known office-building (fig. 3,): the ceiling and the bottom do not describe a congruent form of space, the intersections between the two forms can be considered as belonging to both spaces at the same time. This principal allows the users to interpret these ambivalent spatial situations by placing mobile elements. After a short analysis showing us their theoretical understanding of the principal (fig. 4), the students tried to interpret it, with the full-scale model. But their first interpretation was usually incorrect. So they drew sections through their full-scale model (fig. 5) and compared them with the sections of the Central Beheer. They discovered their mistake and did a second interpretation, which used the theme in a more convincing way (fig. 6).



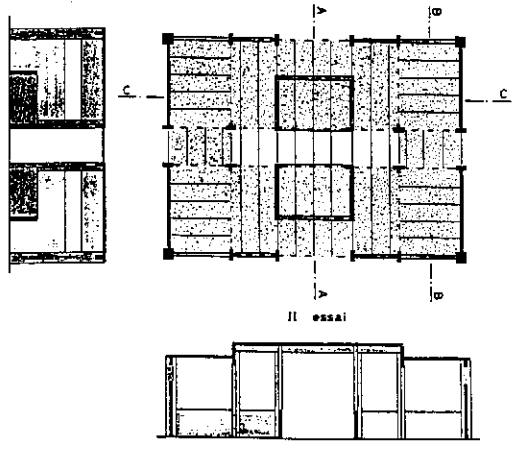
3 **Central beheer by Herman Hertzberger; section and perspective**



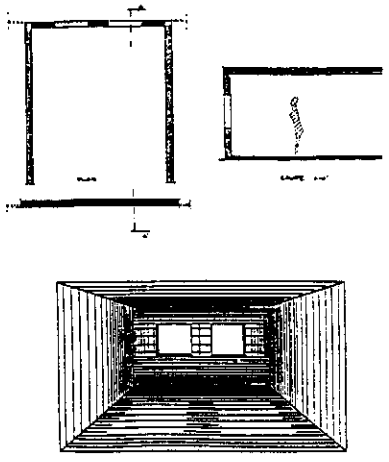
4 **Analysis by the a The ceiling ar bottom don't de congruent form of**



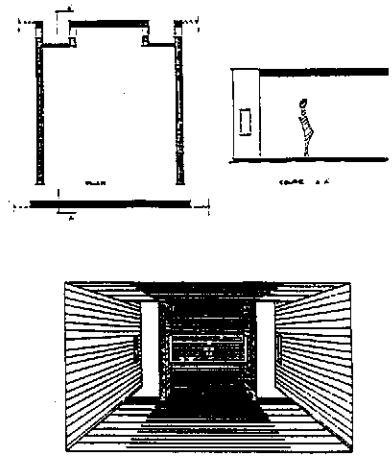
5 **Study in the LEA: the first and incorrect interpretation of the principal; plan and sections**



6 **After discussions and some changements: the second and correct interpretation; plan and sections**



7 **Windows as holes in the facade of a new building in Lausanne**

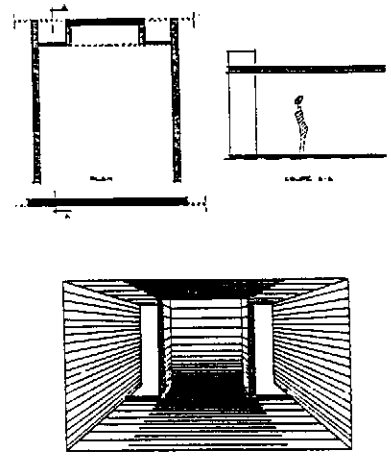


8 **Fonctional distinction of the openings in the small classrooms of the Unitarian Church by Louis Kahn**

In another exercise a group of students compared the window type from a new building in Lausanne (fig. 7) with the openings of the small classrooms at the Unitarian Church by Louis Kahn (fig. 8). They discovered the possibilities of fonctional distinction of the openings (air, light, view, etc.) and they developed their own proposition, based on this principal (fig. 9).

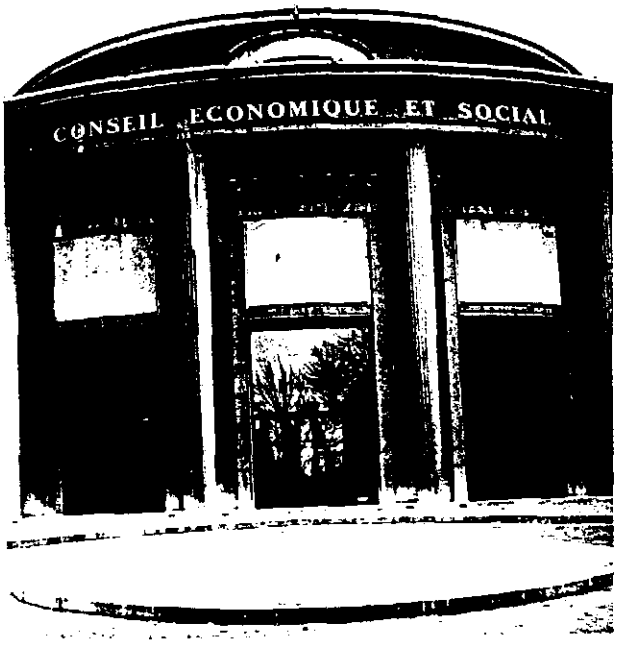
To illustrate the themes we chose examples with distinctive and successful architectural principals. The specific caracter of the lab and its equipment prohibited the students copying the material and formal reality of the chosen examples. The principals of organisation had to be understood by the students, and translated into a language that is possible with the materials of the laboratory. The impossibility of simulation became the stimulus to interpret and to apply a discovered principal.

Too often however the students spent a lot of time analysing the examples in a largely descriptive way, using the full-scale model only at the end as an illustration of what they had found and understood. We started to present a theme by using simple questions.



9 **The students proposition based on the fonctional distinction of the openings**

These questions should help the students to start their study directly with the full-scale model. Figure 10 shows a part of the facade of a building built by Auguste Perret in Paris and figure 11 the reinterpretation of its principals done by students in the lab. In this exercise the students started with the simple question: What are the principals of the construction of this facade?



10 Facade of the earlier "Musée des Travaux Publics" by Auguste Perret

11 The principals of organisation of the facade reinterpreted by the students in the LEA

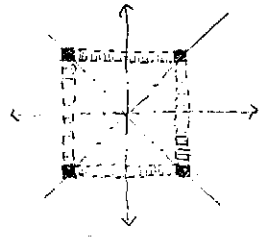
12 An exercise of demonstration, situation A

13 Demostrati

In general the suggested questions were concerned with:
- The relation between construction and space, solid and void.
- The different ways to forme a space.
- The different relationships between spaces.
- The different ways to form a group of several spaces.
- The spatial sequences.

But often our questions were too abstract and too far away from the questions the students were working about in the design studio. And so, we tried to introduce a number of frequent design-problems such as:
- The organization of the facade.
- The organization of the plan.
- The angle.
- The opening.
- The transition inside-outside, outside-inside.
- etc.

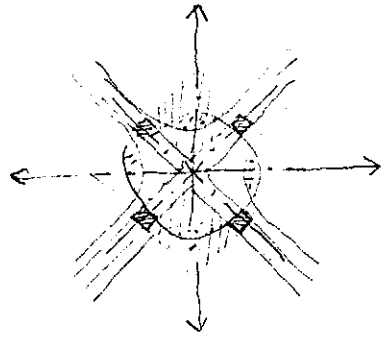
Architectural principals could now be presented, understood and explored as possible approaches of a studied question or problem.



14 Sketch which tries to translate an experience of the situation A

In the actual concept of the exercises the full-scale model is not the final objective. It is one important station that the students use several times during the exercise to deepen their knowledge of a certain theme, question or principal and to explore its qualities and limits. But at the same time they use other tools and representations for their exploration: texts, small models, different types of drawings and the computer. They learn to employ these different tools, to appreciate their specific qualities and the surprising discoveries they make when passing from one tool to the next and from one representation to another. They become aware of the difficulty that an architect today can't work directly on a building and that he has to develop it by producing a chain of representations.

In the full-scale model the student gets personnal experience of perception, scale, natural light, spatial organization and so on. Often he discovers by himself mistakes in his interpretation of a principal. And during the discussions inside the full-scale model, it is much easier to determinate the difference between objective and subjective observation, than on the drawings. For many discussions students and teachers prepare two complementary propositions or small transformations to clarify and to discuss the difference between one situation and another. For the first year students we develop exercises of demonstration using systematically such transformations to show fundamental differences (fig. 12 and 13). All the theoretical explanations, discussions and notations (fig.14 and 15) are based on full-scale situations. They are the theoretical exploition and deepening of the full-scale experiences. This is the opposite of a "normal" situation of instruction, where the exercise has to illustrate the theoretical proposals.



15 Sketch of the situation B

The equipement of the LEA at Lausanne has a certain number of caracteristics which were in the past considered as hindrances for satisfying simulations of an architectural reality:
- The particular nature of the materials.
- The suggested idea of constant transformation.
- The rapidity of the transformations.
- The facilities to use the equipment.
- The multiple ways to use each element.

We discovered in our approach of this equipment, that it reveals itself as an independant reality, as a set of pieces which can be assembled in various ways, producing temporary full-scale situations. Its characteristics are probably more stimulating for didactic experiments than those of a more realistic tool for simulation. We understand it as an excellent instrument to create a didactic situation in which the student learns not only to recognize and copy an architectural language - the language of an actual star for example - but to understand and apply a certain number of basic principals, thus preparing him to choose between some fundamental attitudes, when working on an architectural problem.

(Text and presentation by Bendicht Weber,Lund, september 14, 1990 and Lausanne, november 29, 1990)