Experimental Spatial Structures
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Introduction
To speak about Experimental Spatial Structures at first means to find the right definition. Therefore we have to find definitions for three different subjects experiment, space and structure.

Experiment - that means to perform scientific experiments. The attempt, the test, the simulation, the model. To do experimental work, that means to take measurements, to count, to compare, to try analyzing, to find out differences between substances. In our case, the experimental character of our work is impressed on working by using different methods to show the basic idea of our theme. To act and to use the full-scale-models with your body. Space - that means architectural space which is defined through architectural spatial elements: wall, ceiling, floor, corner, staircase, way, opening, border, edge and so on. So to speak the substances we need to do our experiments. Structure - means order. The contemplation and the comparison of different spatial structures allows the division of different basic subjects like: euclidian structures or physical structures or the depth of space and so on. To analyze or to design architectural space by using spatial structures as one possibility to do architectural work. As a summary: the experiment or the attempt to show architectural, spatial structures. Space and spatial structures are not only impressed by forms but also and as a main thing by action and moving in space. The role of full-scale modeling, of experimental work related to “reality” in architecture is to simulate basic situations which are not dependent on ideas how they are developed in particular. We try to give some instructions or impressions of elementary architectural structures which can be used as instruments to design space of life.

History
More than 15 years ago, Prof.Dr. Wolfgang Meisenheimer instigated the “Raumlabor” in Düsseldorf as part of his lessons about basic-theory in architecture. So the possibility arose to work on architecture themes in full-scale-models. The starting point of experiences in space or experiences in architecture. Günter Roth, a sculptor, was responsible for the experiments with figures for several years and he influenced our work in his way to speak about the human body. At present he is working as sculptor in Milano but his message still exists in our room. For more than six years now, the author has been
working together with Wolfgang Meisenheimer as well as in his main profession as architect. In my opinion the idea of our full-scale work is to ask and to show what architecture is. To give a basic idea of the Düsseldorf full-scale work two examples were chosen as "heading-pictures" (Fig. 1-2).

At first we think about the questions to be explained. Then you have to plan how to get results, how to document your work. The sugar, the paths, the density of paths and why the ants use the paths in this way. If the experiment is successful you know something about the life of ants or, what is better, you find out how to get new questions. Then sometimes it is like a wonderful flower that blooms by showing you the most expressing colors you didn’t expect when you saw the bud. We understand the idea of our “Raumlabor” as chance to act architectural ideas where you can work on a stage to show and to see what architecture is. The students are working as inventors, craftsmen, actors, photographers, sculptors, painters, etc. They have to count, to take measurements, to search for new questions, to try answers, to work and design with their whole bodies. To think about the actual carrying out of a "header into the piano" also represents an important part of our studies and experiments: How to build it, where to get the materials, how to design it, how to show it, etc.
Fig. 2 The header into the piano. This is a drawing done for a theatrical effect. It’s a header into the piano and was made in the beginning of this century. To explain it: The casing is empty. The lid above the keyboard is pushed back. The one below is in three places made of rubber-foil which can easily be perforated by head and arms.

The following chapters will give you some information about the establishment of the “Raumlabor Düsseldorf” and you will see some examples of our studies.

**Establishment**

The dimensions of our experimental area are 10 by 13 meters with a height of 3,60 meters. In this area we divided a field of 9 by 9 meters with canvas-walls in order to get a "white area" where we are able to perform the experiments without disturbing furnitures or materials which are needed to build full-scale-models. We are working with wood, canvas, sand, cord, plaster, concrete, paint, corrugated paper, wire and other materials. Sometimes also old brown leaves, fresh smelling straw, light and fog are used as well as our hifi-installation which allows us to invite exotic birds into our experimental area. Finally, we work with cameras and video and we also have a little DAT-recorder to get some special noises like sounds of the city. Next to the lab there is a little courtyard which is also component of our experiments and which is used as exhibition-gallery for some sculptures.
Organization
In every course about 10 to 15 students participate, coming together once a week for the period of one academic term. We discuss the theme and try to simulate some basic situations by acting with our bodies. Everyone has to do sketches. An important aspect while doing this is, how to show what you have seen and to record the statement of each scene. This work will be continued during the following lessons and after all we produce a documentational booklet. Beneath the full-scale-modelling we also translate several ideas by working with little sculptures, reliefs, models, videos and other methods. In between we discuss the results, ask whether they are useful, and together with guests from other courses we try to get a more colourful and rich documentation. The end of our work is a festival and an exhibition of all we did and every time this is not a mere documentation of our work but also of the fun we had when we made our experiments.

The Human Body
The starting-point of our experiments is to work with your own body. At the same time it is the beginning of full-scale-working. To take measurements and draw with charcoal on big sheets of paper. “Full-scale-drawing...”. To compare measurements, to learn something about proportions. To stand or to sit together, in a circle, in a line, in different formations, to show architectural space in a very simple way. To translate movements of figures into abstract forms or to act with no other resources than your body.

Space
To design and to use space. We ask why it has to be formed in this way and try to find out which spatial elements we need to find exact definitions for our subjects and for the results of our experiments. For this chapter full-scale-models which are documented by doing photographs, sketches, videos, etc. have to be build.

Themes
Each semester has a basic-theme as a heading to our work and discussion. There are subjects like: the staircase, the corner, the senses, the labyrinth, the depth of space, architectural motives, light and space and so on. Each theme has also a basic-idea which says something about the meaning of the work that has to be done. Then we have to formulate questions and to ask about what we want to find out and to plan the experiments we have to do. Beneath our practical work, we try to find several examples from the history of architecture to complete the documentation.
Figures 3 and 4a-h are presenting full-scale work showing: Figures and space; Movement in space; The entrance; Impossibilities; The staircase; Staircase-sculptures; The corner; The labyrinth; The depth of space; Ballhaus: exhibition and experiments outside of the “Raumlabor”.
Experimental Spatial Structures
Together with students from Vienna and Düsseldorf in May 1996 a common course on the theme Experimental Spatial Structures was performed for six days at the Viennese Full-scale Lab. The idea was to work out five different structures of space:

a. Euclidian structures of space (fig. 5):
   - straight line structures, rectangular structures, parallel structures.

b. Physical structures of space (fig. 6):
   - up and down structures
   - the heaviness of mass
   - the plumb-line
   - the pendulum
   - the hammock
   - the feet
   - the head
   - the falling
   - etc.

c. Psycho-physiological structures of space (fig. 7-8):
   - space of living, loving, dying, working space, space to relax in;
   - the theatre with 4 old ladies, the welcome, the meal, the amusement in the garden, the singing birds, the light in the evening, falling fog, etc.

d. The depth of visual space (fig. 9):
   - line of vision
   - point of vision
   - field of vision
   - grading of pieces of scenery which have the same height
   - contrasts in colour
   - to become narrower
   - to become thinner
   - etc.

e. Remember different kinds of spatial structures (fig. 10)
   - for example a building in Vienna and to look for the spatial structures;
   - to document the different structures in sketches.
The 6th day was reserved for the exhibition. While doing some experiment to the different points we wanted to point out their essential marks and the differences between their effects in architecture. The experiments, the discussions and the documentation of different structures which are part of each architecture. The difference between the ways to analyse, to design or to invent architecture.