

# Computer as an metaphorisation machine

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## Keywords

Creation of a form, imagination, metaphors, computer support of form searching

## Transformation of CAAD

*"Computer-aided drafting is uncommon (...), and computer-aided design is almost non-existent..." wrote G. Stevens in 1991. Six years later, at 15<sup>th</sup> ECAADE Conference I wrote "...computers have not had much impact on architectural design process, especially on architectural creativity." (Asanowicz A., 1997)*

These two sentences are still very current. The situation in design has changed very slowly but fortunately, distinctly. Digital media is transforming the practice and teaching of design. Information technologies offer not only better production and rendering tools but also the ability to model, manipulate, and understand design in new ways. A new era in CAAD has started. One of the aspects of this situation is the increase in the number of computers in design offices and architectural schools (many of our students have their own computers, which are often better than the computers we have at our school). We can submit a proposition that the critical point in the creative use of computers is over, and we should think how computers and new media may extend the designer's perception and imagination.

First efforts to do so have already been made. This is proved by the titles of the topics realised in the different schools of architecture ("Explorations in Liquid Geometry" - at School of Architecture, University of California at Los Angeles), the names of subjects connected with CAAD (elective design seminar - "Poetic Potential of Computers" at College of Architecture and Planning, University of Colorado at Boulder), or joint works undertaken by the ECAADE members (AVOCAAD - Added Value of CAAD – a topic realised within the framework of LEONARDO).

In result, digital media transform the practice and teaching of design. Information technologies offer the possibility to model, manipulate and understand design in new ways. The possibilities of the computer, its form-creating potential and interactive abilities, together with the presentation of what was created and also of the entire process of creation, describe to us the areas where we can find the beginning of some new conventions. (Asanowicz A., 1997) In these conventions the computer is used creatively - in an affective way- as a stimulating medium in the process of form searching, as mediation techniques between the idea and its visualisation.

## Form searching and imagination

The search for the architectural form is an extraordinarily complicated process, difficult to explain or describe. The architect starts his work from the design parameters, usually presented in the form of a text. The objective of the architect's work is to develop a graphic model of the designed object.

**Form instead of words** - this phrase encompasses the sense of creation and it is at the same time is biggest problem.

The basic term playing the most significant role in the process of the creation of form is the **fantasmat** - a creation of the imagination, a way of imaginative vision and construction of reality. The fantasmat is an effect of fantasy. St. Thomas, when quoting Aristotele, said "Without images (fantasmata) the human is not able to understand anything". (Thomas Aquinas, 1949) This opinion is the development of the idea of Symonides, who talked about poetry and painting in the categories of intensive visualisation. One cannot think without imagining. The imagination is an intermediary between the perception and the thought. The imagination, as Porta wrote in 1602 in his "Ars reminiscendi" - "draws images in the imagination as if with a pencil". (Yates F.A., 1972) That is why the function of the imagination based on putting in order the visual images in the mind is absolutely basic in the cognitive process. There are certain spatial metaphors underlying all our understanding. Metaphorical and analogous thinking plays an important function of going beyond the current signifying and notional structures, which is exceptionally important in the designing process.

A specific character of the composition activity of an architect is associated with the methods and modelling ways of spatial forms. Creativity is realised as a process of making an ideal model real. One of the basic designing media is the sketch because it ensures the operational and flexible fixation of design ideas. Each sketch, being the ex-

pression of a defined view of the form, allows for an evaluation and formulation of new aspects of the idea of composition. At the same time, a deeper interpretation of the architectural image requires the development of a sufficiently long sequence of visual models. In traditional graphic art, as design experience shows, such presentation of the transformation of the composition is extraordinarily difficult.

Graphic computer transformation, together with the creation of the history of the undertaken activities, allows for a fuller exploration of design metaphors, for the metaphorisation of the process of form creation.

## Computers metaphorisation

The use of computers for creating metaphors can take place on the basis of the four following methods:

**I – Searching for the form through Scansketches.** In this method different objects are first scanned. For example, in course of working on the project of a square at the Imagining Imagination Workshop in 1997 at Delft University of Technology, small pieces of colour paper and beads thrown among them, which were to represent the movement taking place on the square, were scanned. That way, a series of scanned images was obtained. The images were achieved by coincidence, however not without the intervention of the authors, who were responsible for choosing the amount and the quality of the elements used. Few images best satisfying the imagined ideas of the authors were selected and they were later subject to computer graphic processing. After a number of transformations, bit maps corresponding to the already shaped idea of form were obtained. On that basis, a visualisation was developed. (Asanowicz A., 1999)

**II – Creation on the basis of genetic algorithms.** This tool we can use as an artificial DNA to gener-

ate a multiplicity of architectural or environmental possible events. As C. Soddu wrote: "Every morphogenetical project is a subjective metadesign for the reason that it is not an optimised arrangement but a system can generate a lot of possible parallel scenarios." The changes in the design can be introduced by changing the parameters of the "evolution code". (Soddu C., 1994) The process of metaphorisation can take place in two different ways. Method A – the metaphorisation on the basis of the image being the **result** of the activity of the algorithm. Method B – metaphorisation through a perception of the sequence of images taking place **at the time** of the activity of the algorithm. The perception of a flowing animation reflecting the course of the morphogenetical process causes defined impressions and emotions in the viewer, just as it often happens in course of watching a film.

**III - Morphing.** This method is an interpolation process in which object X is mapped onto object Y, and the in-between steps are calculated. The activity is similar (from the point of view of generating the in-between steps) to creation on the basis of genetic algorithms. In case of morphing, based on summing up two equivalent initial forms (for example two architectural objects), the process of creating metaphors could take place both according to method A and B (see: method 2). In case of using non-equivalent forms (for example the architectural object and a random geometric form), the metaphorisation takes place in accordance with the second method (B).

**IV - Photoshopping (filtering)** – searching for the new form of the transformation of ready (existing) images. The difference between scansketches and the proposed transformations lies in the fact that with regard to the first ones the author has the influence on the selection of the elements, which are to be scanned and can be used as the basis for creating the image. In case of transformation we are dealing with the digital form of the image (computer graphics, text) and the activities of the de-

signer are limited to manipulating them by means of all sorts of filters. The obtained images can be used as digital sketches of architectural forms.

### **Example of the fourth method**

- The graphic file (fig. 1) was opened in the Microsoft Word, in result of what a "bad" (damaged) text in the .doc format was obtained (fig. 2).
- The obtained series of symbols and letters was subject to graphic compression by changing the interval between the lines of the "text". In order to obtain a more contrastive image (what is important in further graphic processing) the symbols were made thicker by using the Bold option.
- The text file was exported to CorelDraw to further transform it into a graphic file.
- The obtained graphic file was subject to modifications under Photoshop by using different types of filters. (fig. 3)
- The image, being the result of transformations, was subject to vectorisation in CorelTrace, what made it possible to obtain a .dxf file – possible to open in AutoCAD. (fig.4)
- Under AutoCAD, the planes were given different thickness. The obtained spatial model was subject to rendering in 3D studio and a metaphor of a city was achieved. (fig. 5 & 6)

## **Conclusion**

The methods described are not intended as completed works but act as vehicles for testing various sketch-design techniques through the interactive use of digital media. The method described above broadens the use of CAD into the field of conceptual design and makes it possible to use computers the initial stages of the design process. The computer, when used as a "metaphorisation machine", stimulates the designer to more effective work

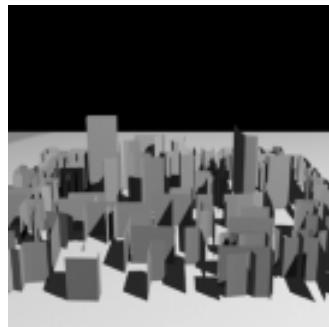
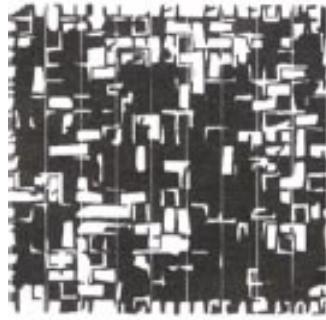
when generating the idea of the designed object and can be treated as the extension of his abilities.

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Figures 1-3, 4-6