

Virtual analogy and Architecture

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“... the mind doesn't make that to use analogies: the aim of the cognitive activity is “to simulate” the perceived real while elaborating a mental analogon (representation), and to simulate the conceived real while elaborating an analogon idéal (theory). In these conditions, the analogy, that appears us in the beginning and to the term of the knowledge, is the means and the end of it at a time. ”
(Edgar Morin, 1986)

The analogy

Our fashion of thought is dialogic in its way to use simultaneously logic- mathematics and analogical approaches (Morin, 1986). The analogy works as well at the level of the unconscious by the construction of an analogon that permits us to recognise a face between thousand of others, despite changes intervened in time; as consciously where by an effort of constructive analogy, we establish bridges between different events or domains giving to the design a new lighting that puts it on the way to a solution. For this reason visual approach acquires a great importance in the establishment of similitude in conception. Many testimonies of scientists, philosophers, artists confirm this observation about their creative work, while underlining the danger of no founded analogies. In current life, analogy brings a support of likeness to the daily conversations, and the possibility to advance in the dialogue by a chaining of analogies having for objective to strengthen the speech.

What interest us here, it is to speak about the analogical approach in the setting of the process of design while trying to answer the following questions:

- what is the mechanism of analogy construction between far away to first sight intellectual domains ?

- in what manner does function the analogy in the setting of the space of design?
- in short, how information technologies of (IT) and virtual may architecture?

Five levels of analogy can be reported,: the analogy of : proportion and equal relations, form, function, organisation or structure, the free analogy, or poetical, “vive” according to the happy expression of Paul Ricoeur (1975).

In the design of artefacts, the graphic representation is the privileged medium by which the analogy orchestrates the physical fitness in the space of design. It is in the same time an instrument of modelisation and analogy making. At the visual level it works in project space with the help of the geometry primitives: point, line, contour and surface, while producing different graphic signs on a support, and making call to the whole artistic effect arsenal. The representation works by differentiation between bottom and contour by the application of visibility laws set by the visual variables and vision in depth. While in the space of design it established and justify likeness on a multi-criteria basis.

Analogy at work

Currently, there is not global cognitive theory of how

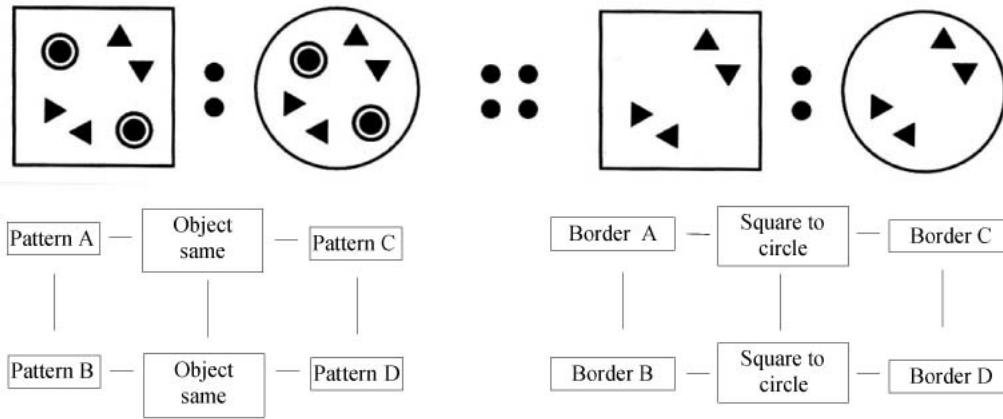


Figure 1 (left). A geometric analogy in which the border is changed, adapted from Goswami (1992)

analogy works. Nevertheless, an explanation is given with the help of the notions of “system structure”, mapping and multi criterion filters of similitude, structure and intention is proposed by E. J. Holyak (1996).

The analogy functions through a construction of relation between the object source and the goal object in establishing relations of different level of similitude. The survey shows that a three years old children is capable to establish analogical relation of likeness object to object. This type of relations, of first level, is also the one that use primates (chimpanzee) for the resolution of their daily problems. For analogical relations of second level, by attribute, they become operational for children of six years, but are not to the reach of normal primate. Exception made of Sarah, female chimpanzee, who after an extremely elaborated teaching is the only ape that has reached this step by the acquirement of a symbolic elementary language permitting it to use the notions of equal and different. However, these performances remain at the level of the implicit knowledge. Only the passage to explicit analogy thanks to the mapping “of structure system” between the source and the goal analogy allows the human adult to enter into the difficult and fascinating path of the creativity on ways of the artistic, philosophical or scientific imaginary.

Virtual analogy

The computer creates analogies by differentiation of modes of modelisation and representation. Different analogies cohabit there in virtuality, they mingle the implicit of random calculation and user’s gesture, and the explicit representation of numerical models. The graphic interfacing, capacity of modelisation-simulation and memory of the computer is requested more and more by two opposite and convergent approaches:

- On one hand, the one of the passage of the implicit analogy produced by the user’s gesture toward the explicit of the modelling through a rebuilt representation.
- On the other hand, the explicit analogy produced as the result of the mapping of a “system structure” between source and objective analog.

Computer permits to experiment the hypothesis of how certain aspects of the analogical cognitive process works in the setting of researches in artificial intelligence, cognitive psychology and philosophy. The system of structure functions through various filters and arise the delicate problem of the utilisation of the

“parallel constraint satisfaction” in the elucidation of the mapping. “Connexionist” approach in cognition starting their works from the Gestalt “Theory approach to the Necker’s cube put forward an hypothesis permitting to explain the multi-criterion mapping process. (Figure 2) The perception of the left edge of the cube undergoes a continuous displacement to the front and backward in relation to others edges of the cube, provoking every time a bipolar complete change of our perception of the cube. These swings of a global representation to another one can be considered as the result of the mapping of a set of elementary interpretations of the cube. This kind of process gives account of the manner how parallel constraint satisfaction can act together in the implementation of an analogy, regardless of the possibility of a certain level of conflict between different elementary constraints. (Figure 3)

This hypothesis permitted the construction of many computer programs aimed to experiment these hypotheses by the production, Evaluation and justification of the numerical analogy pushing forward the knowledge of analogy.

Virtual analogy and architecture

Information Technologies are changing our space perception and representation in a drastic way. A lot of representations become evanescent, fugitive and an “aesthetic of disappearance” is being born. The screen becomes the window, the door that opens up on the world, one arrives without leaving, creating a

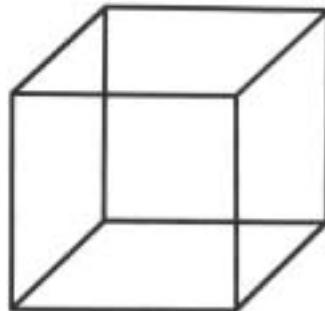


Figure 2 (right). Necker's cube

Figure 3 (far right). System structure mapping schema

feeling of ubiquity. By the zoom effect of and mosaic display it transforms our way of seeing by adding to the “quattro cento” perspective the more archaic “fish bone” one. The television in direct and the animation in real time with their dynamic and multimodal representations install a simultaneous perception by projecting real and virtual spaces in a delirium of pictures and sounds accentuating their dynamism (Porada, 1997).

Architecture that is always very attentive to the technological innovations remains for the meantime conservative in its whole, and seems to be influenced more in its form by new construction technologies and materials. Their use produces transparencies, disappearances, apparitions and new space dialectics: interior-outside, skin-structure, etc. These spaces appear as many “clin d’oeil” to information technologies, more than a direct consequence of their effects (Porada, 1997). Contemporary philosophers concepts seems more operative on the new space construction and its justification than that of the IT. Which work meantime with the concepts of deterritorialisation, decomposition, simultaneity, plan of immanence, etc. elaborated elsewhere, in their action to push the virtual representation of the architectural object in its terminus of explosion and formal complexification. Spaces are presented under the title of Transarchitecture (Novak, 1998) Hypersurface architecture, etc (Holyak and Thagard, 1996) (see Figure 4).

Are we in the face of new architectural spaces, or are we in front of new representations of conventional

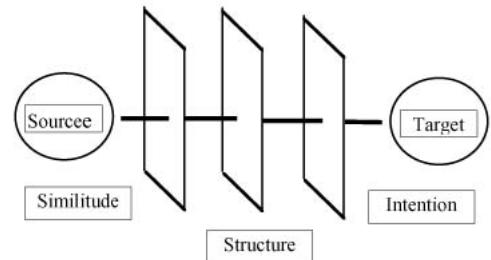
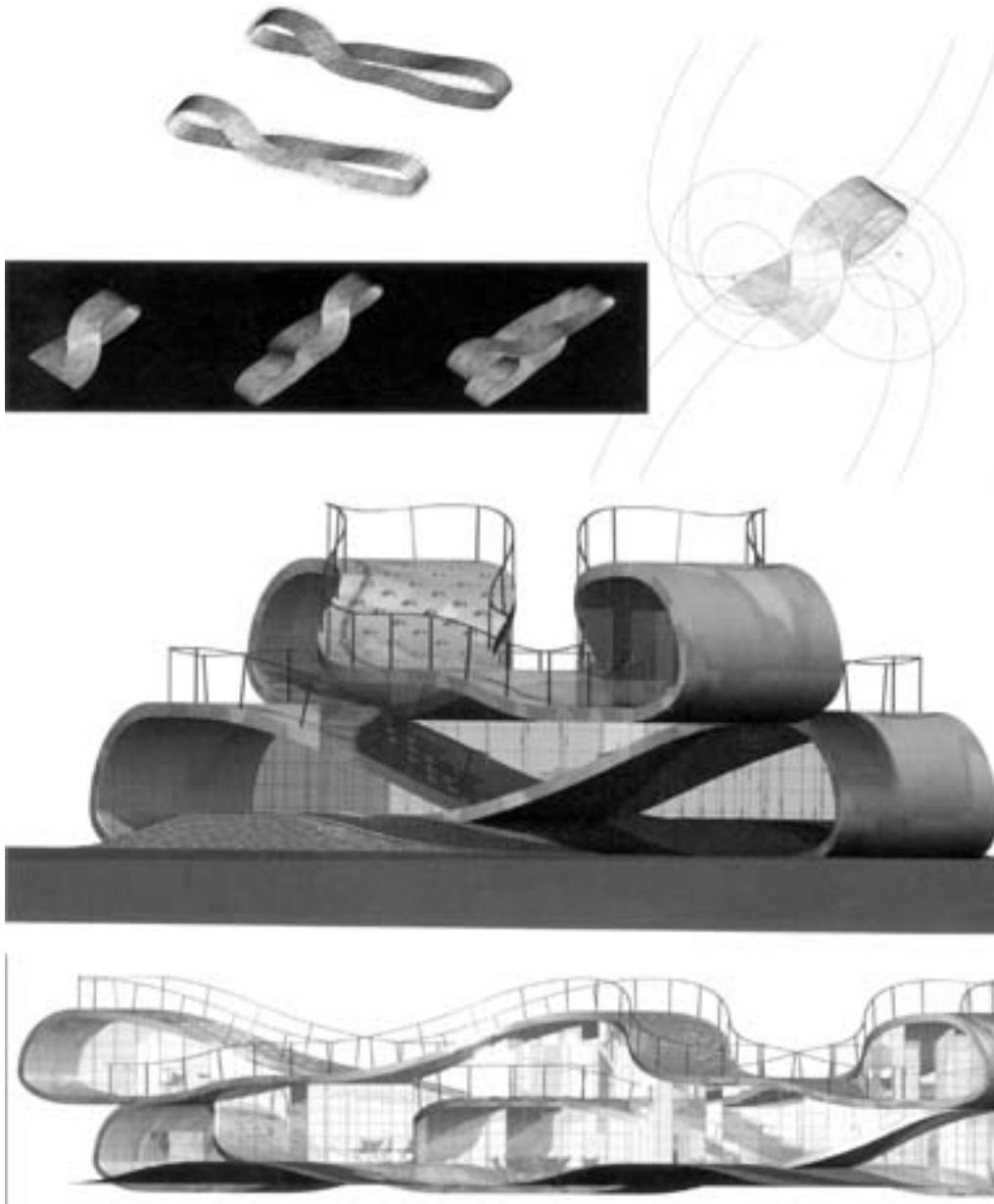


Figure 4 (left). Example of
Hypersurface Architecture



space? What is obvious is that one is in presence of a new technological instrumentation that acts with new form and composition concepts, and this should on the long run produce the announced mutation and the waited apparition of a new architecture. But it is necessary that architects put themselves “the hand to the dough”, which is not the case for the most part of famous architects, who works in majority through an intermediary of a “traduttore, traditore.” (Fillion, 1996).

The implementation of virtual analogical environment and a better understanding of the analogical approach could help this mutation, in the condition that criteria of form construction takes into consideration all existing strength fields involved in the architectural object, and not only those of the form.

References

- Morin Edgar, *La méthode 3, La connaissance de la connaissance*, Essais, Points, Seuil, Paris, 1986.
- Ricoeur Paul, *La métaphore vive*, Essais, Points, Seuil, Paris, 1975.
- Thyagaraj Keith J. and Thagard Paul, *Mental Leaps*, A Bradford Book, The MIT Press, Cambridge, Massachusetts, London, England, 1996
- Virilo Paul, *Esthétique de la disparition*, Bilio, Essais, Paris, 1974.
- Porada Mikhael, *Third Millenary perception*, in “The living building in Europe toward the third millenium”, International Symposium Proceedings, University of Naples Federico II Building Engineering Department, Naples, October 10-11 1997.
- Porada Mikhael, *Information Technology and Architectural Space*, in Cyber Real International Conference, Architectural Faculty, Bialystok, Poland, 1997
- Novak Markos, *Transarchitectures and Hypersurfaces*, Operation Transmodernity, in Architectural Design, “Hypersurface Architecture”, Vol 68 N5, May-June 1998
- Perrella Stephan, *Hypersurface Theory*, Architecture and Culture, , in Architectural Design, “Hypersurface Architecture” Vol 68 N5, May-June 1998
- Fillion Odile, *Espace=Ecran*, Douze architectes et les images de synthèse, Architecture & Prospective, Infographie Recherche et Développement, Paris, 1996
- Goswami U., *Analogical reasoning in children*, Hillsdale, N. J. Erlbaum, 1992

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