INFORMATION STRUCTURES IN THE DESIGNING PROCESS.

Jadwiga C. Zarnowiecka
Faculty of Architecture TU of Bialystok
Krakowska 9, 15-875 Bialystok, Poland
tel./fax: 0 (85)422929, e-mail: zarnow@cksr.ac.bialystok.pl

Problems

Nowadays we deal with a real revolution in the computer science. Present times explorers no longer look for information in vast library files but rather they surf on Internet. The technological progress in the realm of computer studies made "the fathers unable to keep pace with their children". That's one of the reasons why it is so difficult to introduce new techniques into the routinized designing process. The problem is that some know "what" and the others "how". At the times when drawing pens were ousted by rapidographs, communication between different generations of designers was easier. Both of these tools are, in fact very similar. It is the other way with the new computer science technique, which consists of complicated systems not so easy to access because of various economical, emotional, routine and habitual reasons. Changes in the designing process go step by step, in a much slower pace than the progress in computer hardware and software. It is difficult to accept the fact in professional environment that computer technique can assist the designer as a medium#1.

Usage

Until quite recently, the designer facing a design problem was limited in the amount of information he could have at his disposal. Comprehension of the whole issue depended on his knowledge and intuition. At present the computer technique assists the designer. It has happened, until now, mostly at the stage of technical documentation formation. A lot of manual activities were transferred to computers. People got the possibility of quick and easy introduction of corrections, but also the possibility of copying errors in easily duplicated solutions. However, one can expect in the nearest future, that due to the possibility of fast and precise getting and processing of the information, technology would also assist the intuition. The use of new technique can cause the unexpected inspirations to appear. They can be pre-programmed, for example by use of data bases concerning cultural environment. Up till now information about cultural values has been diffuse and difficult to access. A lot of additional options will arise in the process of conception formation. The choice of that one which is the most proper will become easy.

The characteristic feature of town and country planning is its expected flexibility of solutions. The more distant the period of time is concerned, the more flexible the

scope of solutions should be. That is why the possibility of easy simulation of various solutions is of the greatest importance in the creation process of town-planing conception. In this way the results of location decisions taken can be checked earlier. Creation of models is the only possible experimental method in this domain, because it is impossible to experiment "on the live organism" of the city.

Interest in creating software used in architectural town and country planning is still growing. This is the result of not only the very fascination of the designers with a new tool, but rather growing awareness of huge advantages of its use.

Solution

The solution of program problems is the creation of some information structures and looking for relations between them. At a higher level it may be the creation of SYSTEM which will consist of integrated multimedia data bases. Then those data bases should be included directly or indirectly in programs functions which assist designing process.

The knowledge of interdisciplinary team is necessary in order to create information structures. Until now attempts of creation of such structures are still partially. Perhaps this problem can be solved by new designer generation "familiar" with computer technique. New restricted Polish legislation (Act about town and country planing -14.12.1994, Act: Building law - 7.07.1994) will affect looking for cheaper and more effective solutions connected with execution of for example the necessity of actualisation of town and country planing. Smaller, specialized teams equipped in SYSTEM technique will be able to cope entirely with employers' demands.

References

[1] Glanville R., Representations Fair, Honest and Truthful, [w:] Materialy Konferencji: "Komputer w projektowaniu architektonicznym i dydaktyce", Bialystok, 1994;

[2] Proceedings of the ECAADE Conference, Glasgow 1994;

[3] Proceedings of the Conference "Computer in Architectural Design", Bialystok, 1995;

[4] Proceedings of the Conference "Computer in Architectural Design", Bialystok, 1996.

Semiotics of the CADD model

The initial assumption is that a computer model of a building consists of the following types of models:(1)

- iconic model 2D

- iconic model 3D

- simulation

- description

- chart

- outline

Architectural designing can be divided into the following stages: (2)

- initial draft design;

- general concept design, presentation and evaluation;

- detailed and technical design;

- management and supervision of construction.

It was assumed that the proposed hypothesis should be verified by analysing selected buildings which were designed

with the use of a computer model. Recent architectural designs were selected for that purpose.

Tables were used as the main analytical tool, supplemented with description and graphic representation.

1. If an element of a computer model was found to appear in a given stage of designing, it was marked with a + sign.

2. If no elements of a computer model were found in a given stage, it was marked with a - sign.

3. If one of the stages was sidestepped or it was difficult to determine wether the computer model was implemented, the marking ne (negative) was used.

The analysis of 26 examples led to the modification of the initial hypothesis:

- outline is a version of the iconic two-dimensional model;

- simulation is part of the iconic three-dimensional model;

- chart is contained in the description.

On the basis of that it was assumed further on that a computer model of a building consists of the following types of models:
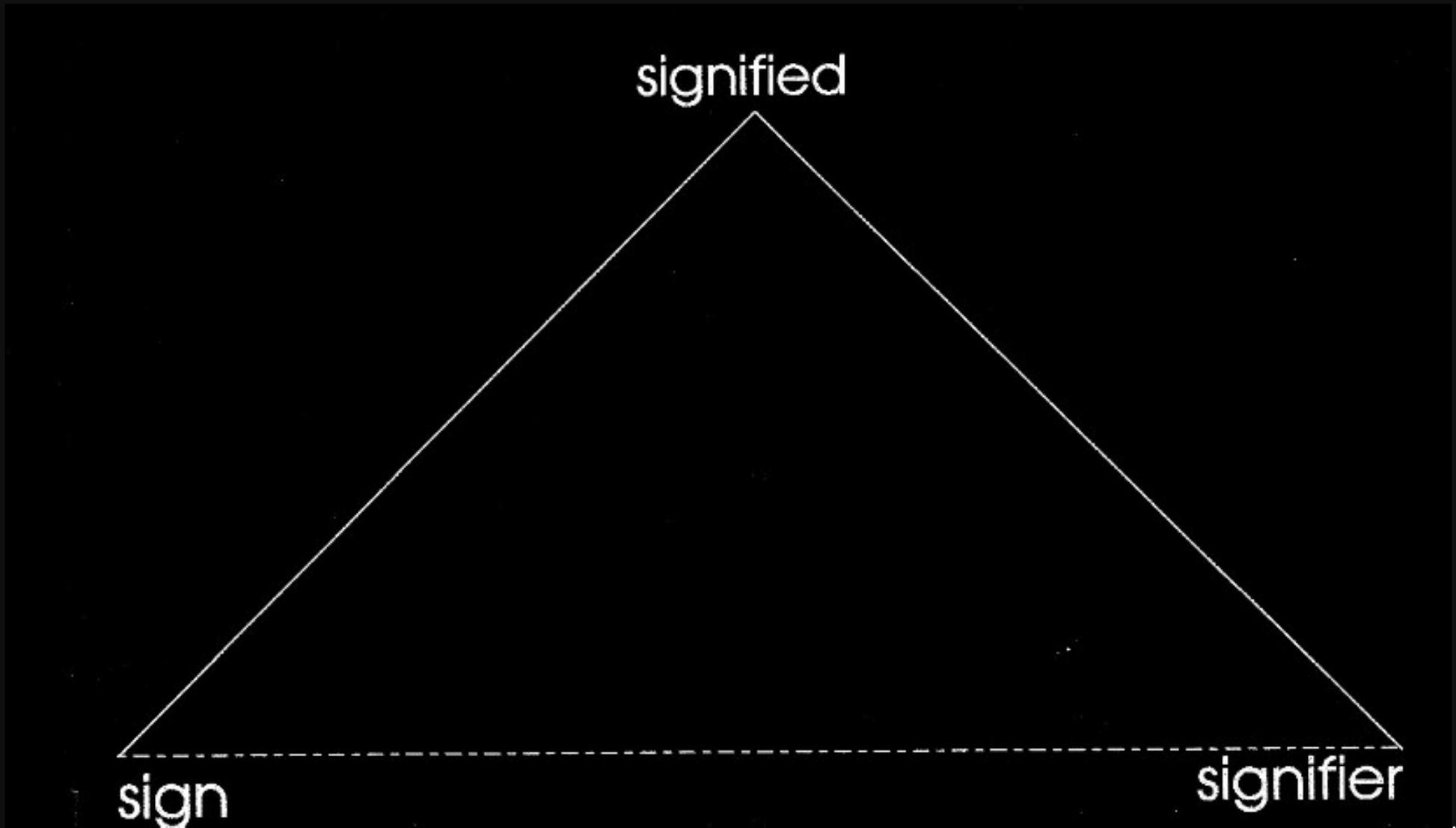
- iconic model 2d

- iconic model 3d

- description

A semiotic interpretation of a computer model of a building

Semiotics and its methods are used for analysing phenomena connected with meaning and semiotics itself (3) is defined as

a general theory of signs (4). In the context of mass media semiotics and its methods are used for analysing radio and

television programs, feature and animation films, newspaper and magazine articles, posters, etc. As has been said in the

beginning, because a computer model of a building is a complex entity, various research methods are used in this

work. Semiotics is one possible method of interpreting a computer model of a building. The term ,,description" is

often used in this work. One of the basic descriptive tools is language, and semiotics, a discipline akin to linguistics,

seems a possible instrument for analysing computer models in architecture. Semiotics can also help to give a fuller

picture of a computer model. Signs in semiotics can be words, images or any other items

generating ideas; signs are generators of ideas. Every sign consists of a signifier, signified concept, and signified (5).

To visualize the relationship between the elements that make up a sign, Ogden and Richards proposed in 1923 the so called classic triangle of signification

(fig. 1)

In the case of a computer model of a building the relationship presented in fig. 1 could look as follows:

sign iconic model 2d

signifier digital model presented in a graphic form

signified concept an element of a computer model

To give an example, the entity known as ,,tree" would be

analysed as follows:

sign the written word ,,tree'

signifier the letters ,,t-r-e-e"

signified concept the category ,,tree"

In natural language the relationship between object (signifier) and meaning (signified) is often conventional and arbitrary. Three types of signs are differentiated:

- iconic: sign resembles signified meaning (portrait, photo, X-ray photo, map);

- symbolic: sign does not resemble meaning, it is arbitrary or conventional (the word ,,stop" or the red light);

- indexing: sign is in some way (intended or unintended) connected with meaning.

These three types of signs are not mutually exclusive and can appear jointly: a thing can be an icon, symbol and index or any combination of two of them.

Film and television use all these sign categories:

- voice and images are iconic signs;

- speech and writing are symbolic signs;

- the effect of what is filmed is an index sign.

Semioticians claim that iconic signs are in the majority.

Analogically, a computer model of a building can contain all three types of signs (iconic, symbolic and indexing), but iconic signs prevail, as in iconic 2d model. James Monaco

claims that in cinema object and concept (meaning) are identical. (7) This assertion, in the context of our analogy,

can help us better to understand the idea of a computer model of a building. We find that sign (iconic model 2d) is

described by signifier (digital model) which is identical with signified concept, that is an element of a computer model. To put it more simply, the digital model is identical with the concept of the model. Iconic signs are more often read as natural because they are less arbitrary than symbolic signs. Therefore, television, film and photography, which use iconic signs, suggest a narrower difference between sign and its meaning. In mass culture there is a general tendency to replace other types of signs with iconic signs (the rapid development of visual language of communication), and this tendency is also reflected in computer models of buildings. Therefore, when employing semiotics to analyze architectural design, one finds its uses connected with film and television more helpful than ones connected with language. All signs, whether iconic or symbolic, can be understood only within a convention. Semiotic analysis, using the concept of sign, is based on paradigmatic and syntagmatic structures. In this work a paradigm is understood as a classification of signs. In natural language words can function as paradigms, there can also be grammatical paradigms, such as verbs or nouns. As cinematic paradigms one can define, for example, types of editing, such as cuts, dissolves, fade-outs, etc. In computer models of buildings we can define the component models as paradigms. We have, then, the following paradigms:
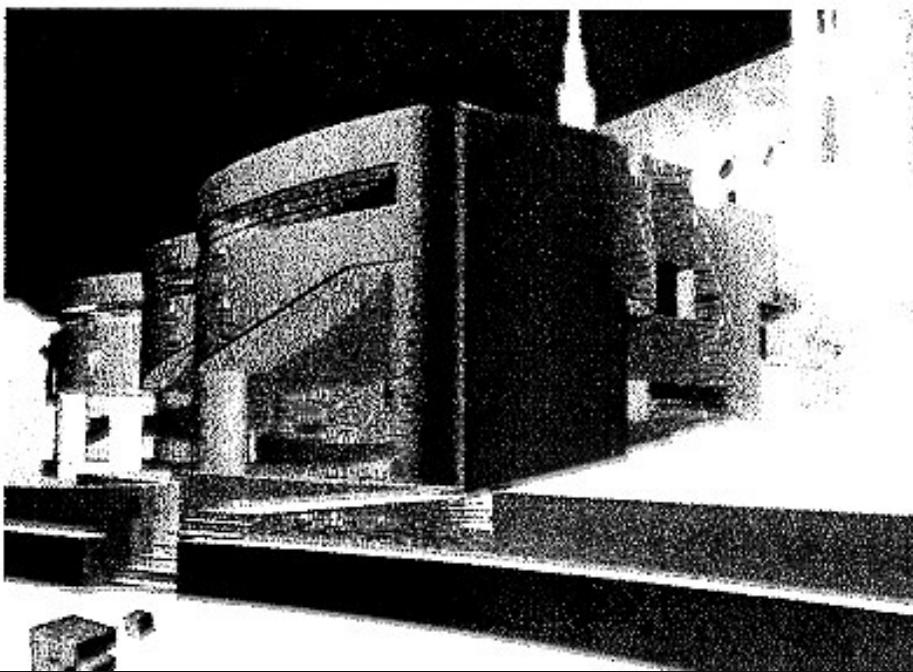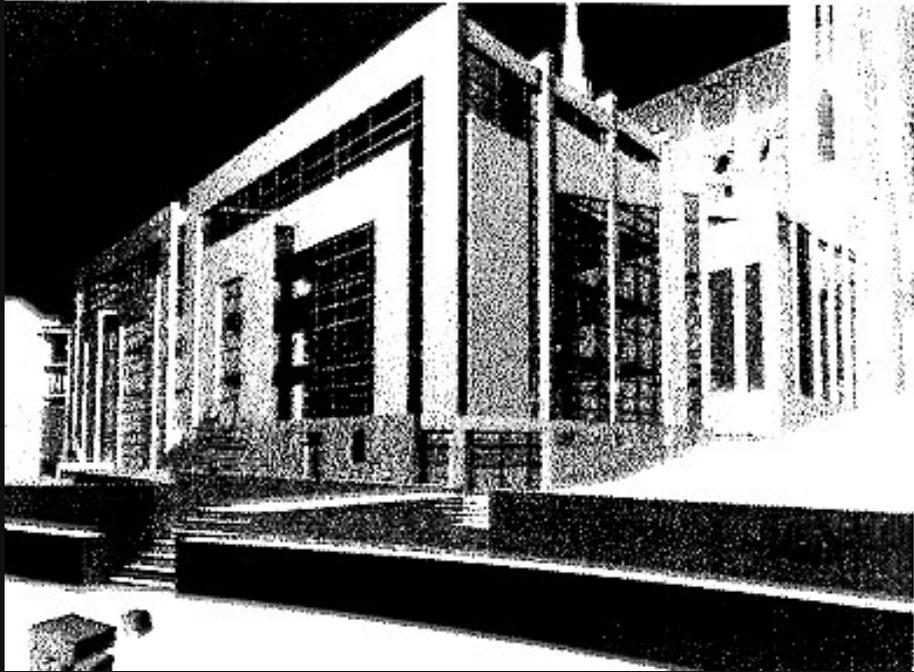
- iconic model 2d
- iconic model 3d
- description.

Syntax is defined as an ordered combination of interrelated signs, written down in a finite form (sequence). Syntax is formed by selecting paradigms, or paradigms may be determined by a system, for example grammar. In the case of film, James Monaco (8) points out that our analysis is paradigmatic if we compare particular shots (not necessarily in a continuous form) with possible alternative shots. When we compare shots in the sequence in which they appear in the film, we are performing a syntagmatic analysis. By way of analogy, a paradigmatic analysis of computer models of buildings is when we compare particular types of models which appear in a given computer model with possible alternative

solutions within each model, or when we analyse different computer models of the same architectural task. For example, an analysis of the overall heat-transfer coefficient for a given design is a paradigmatic analysis of a computer model

(fig. 2)

But simulations of different formal solutions for the same location

(fig. 3)

are also a case of paradigmatic analysis. A syntagmatic analysis would be a comparison within

a given type of component model, with a succession of its subsequent recordings, or a sequence of recordings for the

entire computer model. A recording of successive images in animation by the 3d Studio software is an example of a

syntagmatic analysis, as is the recording of presentation of a VRML model of a chair
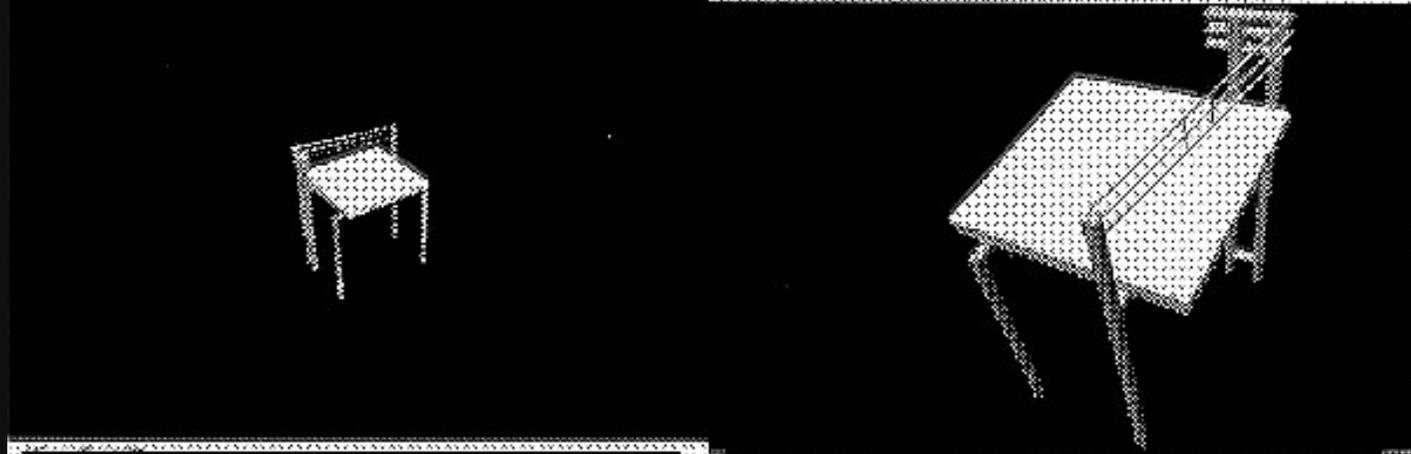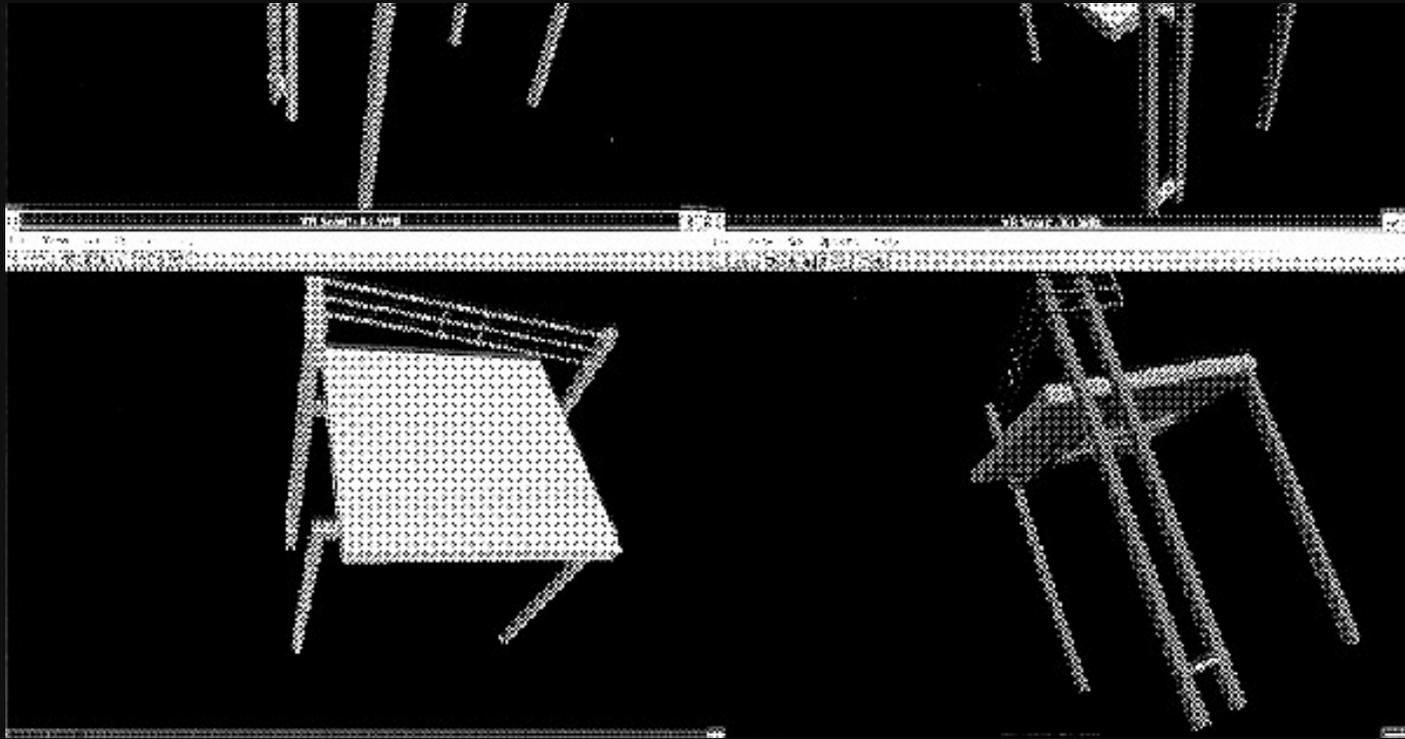
(fig. 4)

Semiotics uses the concepts of denotation and connotation, referring to the order of meanings. (8) In film, denotation is the mechanical reproduction of the object at which the camera is aimed, and connotation is the human part of the filming process, that is the selection of shots, angles, exposure, lighting, etc. Denotation is what is being photographed (filmed), while connotation is how it is being photographed (filmed). On the connotation level signs are more polysemic and easier to interpret. In a computer model of a building, denotation is the subject of the design, while connotation is the way the subject is treated with the help of a computer model.

The categories of denotation and connotation allow for a richer interpretation of computer models of buildings, going beyond technology and pointing to the social and human dimension. Connotational thinking makes frequent use of metaphor (9) and metonymy. (10) Examples of metonymy in film would be turning cards of a calendar signifying the passage

of time, wheels of a railway engine signifying a train journey, etc. In every text signs are organized into a system though a convention which semioticians call a code. (11) The existence of such a convention points to the social dimension of semiotics, because to understand a code one has to belong to a wider community, glued together by means of culture. Codes are not static but dynamic, they change as culture and history change. Hodge and Tripp (12) said it was fundamental for semiotic analysis that a sign system is transmitted through a material medium which has its own structural rules. Some codes are independent of any medium, and some are specific for a medium (for example, fade-out in film), some are characteristic for a number of media (for example, holding up a scene); and some codes follow from cultural practice, for example, body language, which is not connected with any medium.

Text is always based on codes issuing from the culture in which it is produced. One can refer that to the communication of ideas contained in a computer model of a building. The uses of a computer model in various stages of design which are analysed in this work do not lead us to believe that the use of this medium creates a formally, stylistically or functionally specific type of architecture, but they give a picture of the culture within which they were created. Fiske and Hartley believe that „it is difficult to use codes without influencing oneself," and they point out to the paradox that „we are the products of a sign environment which we ourselves have produced." (12) Semioticians sometimes present their analysis as strictly objective and scientific, as opposed to subjective interpretation. But semiotics is criticized for excessive formalism. Using the syntagmatic and paradigmatic semiotic analysis as a research tool, one can show the dynamic nature of computer models of buildings, difficult to interpret with traditional methods. Semiotics does not give a privileged position to any medium, it potentially allows us to take advantage both of the differences and the similarities between the media. Using semiotics we are made aware that when we produce an image of the world, we always do it with signs, which are a construct of the mind.

Illustrations

Fig. 1. The classic triangle of signification according to Ogden and Richards.

Fig. 2. An example of a paradigmatic analysis of a computer model of a building. The overall heat-transfer coefficient for a facility adjoining the amphitheatre in Bia'a Podlaska.

Designed by Kazimierz Butelski, the author's materials.

Fig. 3. An example of paradigmatic analysis, simulation of various formal solutions for the same location, next to the

Amiens Cathedral. Source: catalogue of the annual competition for a design using the ARC + program, 1993 edition. Authors

of designs, starting from the left: Manuel Iniguez, Mr. Ustarroz, Alessandro Anselmi, Cabinet d'Architecture Ausia, Guy Bisson.

Fig. 4. Presentation of a VRML model of a chair as an example of syntagmatic analysis. Design by Kazimierz Butelski, author's materials.

References

1. Krick, E. V., Wprowadzenie do techniki i projektowania technicznego, WNT, Warsaw 1975. The author claims that in the

design process engineers of various specializations use these types of models. We will make this assumption for architects.

2. Mitchell, W. J., Computer Aided Architectural Design, Van Nostrand Reinhold, New York 1977, pp. 75-78.

3. The term ,,medium" will be used here in the sense of work environment.

4. The discipline of science concerned with the general theory of sign. This definition can be found in

R.Grzegorczykowa, Wprowadzenie do semantyki j'ezykoznawczej, Wydawnictwo Naukowe PWN, Warsaw 1995, p. 9.

5. Vox significat rem mediantibus conceptibus - A sound signifies a thing through the medium of concepts. S. Ullmann,

The Principles of Semiotics, Glasgow 1951.

7. The power of language systems is based on a wide gap between object (signifier) and meaning (signified), while the

power of film is based on the absence of this gap. J. Monaco, How to Read a Film, part III, `The Language of Film: Signs

and Syntax,' Oxford University Press, New York 1981.

8. Denotation, called the first order of meaning, refers to the sign (word, signifier) and object (signified), while connotation is described as the second order in the system of meanings. D. Chandler, Process of Mediation - Denotation and Connotation, (in:) Semiotics for Beginners. http://www.aber.ac.uk/~dgc/ sem06.html

9. Metaphor is a stylistic figure in which at least one element is given a different, though connected meaning. In order to understand the changed meaning we have to engage our imagination. Visual language often makes use of metaphor as a means of expression.

10. Metonymy is a stylistic figure in which a name of a thing is replaced with a name of another thing which remains in a certain causative relationship with the first one (crown for monarchy).

11. Or a code of meanings.

12. R. Hodge, D. Tripp, Children and Television: A Semiotic Approach, Polity Press, Cambridge 1986.

13. J. Fiske, J. Hartley, Reading Television, Methuen, London 1978.

K A Z I M I E R Z B U T E L S K I

architect

E-mail pabutels@cyf-kr.edu.pl