The Janus Face of Visualization

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Do New Visualization Techniques and Interests of the Architects Meet in Visualization? In this article I will examine some central aspirations of the visualization techniques and relate them to the intentions which are apparent in the visualizations of some well-known and interesting postmodernist and deconstructionalist architects. From an architect's point of view, one can consider essential the media aspect provided by the new technology. In this aspect the ways of transmitting information and the development of communication possibilities play crucial roles. The article is based extensively on the so called Essu-project[1].

WHEN DISCUSSING THE VISUALIZATION of an architectural proposal with the aid of the new technology, we shall need some central terms[2]: With *representation* I mean the kind of presentation which is aimed for direct visual observation. With *model* I mean the internal qualities of the subject that is being modelled. Using a model one can produce different representations; in this property lies the flexibility of visualization. *Simulation*, instead, means the whole process where the subject will be modelled and where models and representations will be made with the aid of descriptions. In this respect the simulation includes also a functional content; it is not merely producing representations. The possibility of parametrization belongs typically to simulation. Analogies and isomorphisms have been used in model thinking. They have been useful in the portrayal of spatial, structural, and functional relations. However, Christian Burman and Simo Säätelä have noted that it is incorrect to base the epistemology of architectual drawings on the model concept and the reality correspondence principle[3]. It is neither necessary to base the meaning of the drawings on the correspondence with reality (veridicality), nor is the problem of correspondence with reality conclusively important. In the background there are problems, that were also present in Ludwig Wittgenstein's *Picture Theory of Meaning*. Understanding the architectural drawings so that they are composed of elements, significant in themselves, and element combinations is in accordance with the logical atomism. Instead, we can think visualizations to be different versions of the design (or the plan).

The ability of a computer model to produce different kinds of representations is one of the advantages of computers which are therefore used extensively in the design work. The main task of the representations is to transmit information. The models producing information in different forms will be especially typical in the future.

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In this way the new technology can increase the number of variations in visualization.

The possibilities of the new technology

The new computer and video technology continously opens new realms and simultaneously poses questionable old representation conventions. The conventions that we normally ignore suddenly become interesting. Next I will examine three ways of possibilities and trends:

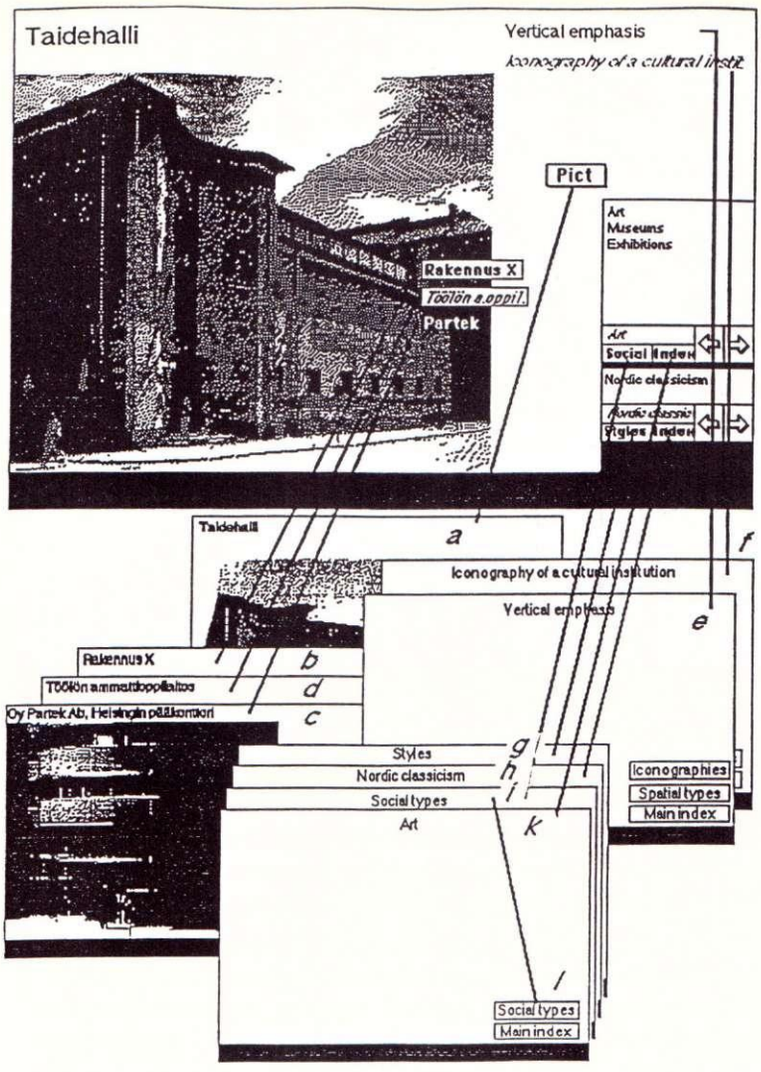
- the emphasis of the media aspect in the new technology;
- the creation of virtual reality (virtual futures);
- the increasing of realism in visualization.

Markku Norvasuo has outlined in our Essu-Project (Aesthetically Qualified Physical Environment and New Planning Techniques) a 'media scenario' of architectural design. The emphasis of the media aspect, (information networks of unlimited capacity, the solving of the incompatibility problem of the design systems, and the expansion of the hypermedia concept) can in their own way lead to the birth of new kinds of planning communities[4].

The nearly unlimited transmission of pictural information may become possible in the future information networks. However, first the compatibility problems should be overcome. Different methods of design and planning, collecting and transmitting information could be largely integrated. So we could solve the technical problems of pictural information. Large picture databases and real time animation would be possible. Fast communicative copy machines could be taken into use. On the other hand sound and text could be integrated into pictural information.

However, the media aspect would not cover only the hypermedia, as understood today. It would totally integrate present implementations and add many completely new ones. Hypermedia itself includes features of both storing and presenting information. To realize the media aspect one should extend the computer systems to (global) information network environments. This kind of development could lead into the birth of completely new kinds of planning communities. It is apparent that it would benefit especially those users who appreciate unlimited communication. Altogether it would emphasize the common value and the free flow of information. Simultaneously the difference between formal and informal information would become harder to distinguish.

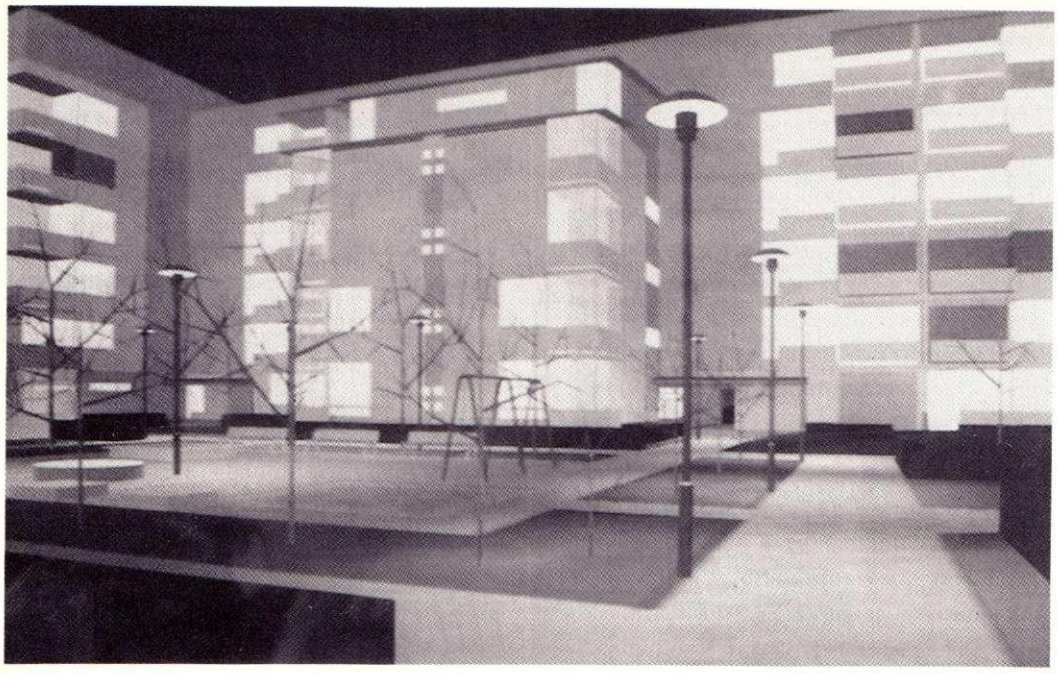
The possibilities of realizing the described ideas are being shown by the ART + COM Laboratory, which uses the ISDN-B prototype net and has been built in Berlin[5]. It makes possible the real time visual communication from an architect's home office. The users can access the still picture and video tape archives of the service centre and the



Picture1. Hypermedia includes features both storing and presenting information. An experimental typology created by Markku Norvasuo and Altti Kuusamo in Essu-project. The use of various typological features: syntagmatic features, morphic resemblance, morphic opposition, structural comparison, spatial type, iconocraphy, index of social (functional) types and example index of selected social type are included.

re-editions of his/her own three-dimensional models. Starting from these can be produced different kinds of representations including the animations. The VTT's visualization laboratory of urban planning and building design is partly based on a similar policy but at the present time without a real-time network. There one can also re-edit pictures, make video programs out of different picture materials etc.

In the virtual reality line of development one tries to create three-dimensional stereoscopic views of environment. These views can be controlled by voice commands or head or hand movements. A computer calculates all the time the view from the model. The basic idea is to expand the human-computer interaction. The AutoDesk-company, which is partly directed at planning, calls their own forthcoming system Cyberspace. There the environment is being controlled with sensors placed in one's head and hands. The intentions to develop an interface involved in virtual realities can be called the process of



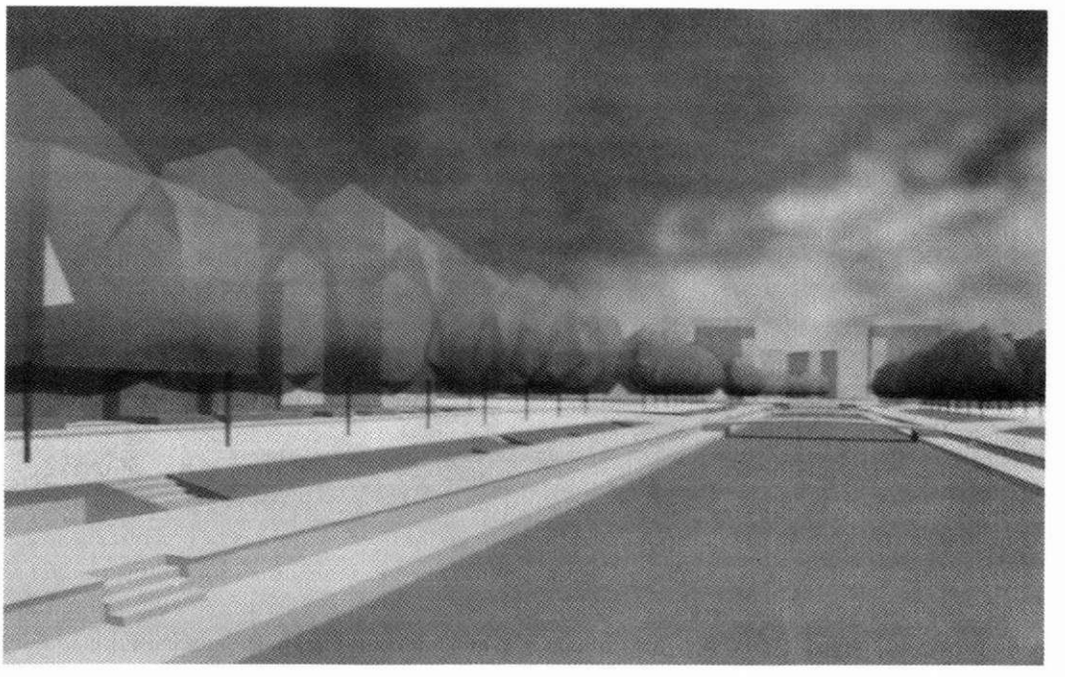
Pictures 2–3. In computer-aided design the geometrical modelling and the physical optics have played a crucial role in efforts to realism. Pictures of computer animation of Ruoholahti area in Helsinki made by Timo Koho and Petri Siitonen in Essu-project.

making the interface conscious[6]. The virtual realities offer a possibility to strengthen the sense of space and the sensibility of the subject.

What is important, however, is that created virtual realities are private, not public worlds. In the traditional visualizations of architectural proposals the perspective pictures have played this role. To benefit the advantages offered by virtual realities, however, one needs advanced information technology. The experiments done so far have shown that the interaction with virtual reality should happen multisensorically[7]. Hauptmann for instance has in his experiments compared the adjustments of experience with the aid of speech, movements and the combined use of those. As an example of the many possibilities of the virtual reality one large Japanese company is designing a virtual interior decorating shop.

In our own studies we have tested a so called 6D-digitizer in the digitizing of three-dimensional objects[8]. It is based on the use of magnetic sensors. The test showed that by developing suitable programs and attaching those to the watching of the stereo screen, one could make the 6D-digitizer a promising accessory. The test was made by digitizing, among other things, a footstool designed by Alvar Aalto. A deficiency of this commercially available equipment was that it is sensitive to magnetic disturbances.

As a third trend of development one can consider the increasing realism of presentation. One can give reasons for it noticing, for example, the increasing possibilities of experience and the easier understanding of visualization. This is intertwined in the creation of



a reality illusion, which is not the same thing as correspondence with reality. In presentative realism the problem, as for example E. H. Gombrich has proved, has always been the question of the familiarity of the ways and conventions of presentation[9]. So if the representations produced with the new technology resemble the traditional ways of presenting in architecture or are familiar from the media or elsewhere, thus the realistic experience might have a larger importance than for example the adding of details.

In computer-aided design the geometrical modelling and the physical optics have played a crucial role in efforts to realism. Its filosofical foundation lies in the so called scientific realism and in the idea of reality correspondence and not only in the desire for realistic illusion. The simulation of the phenomena of the real world is based on the calculation of the behaviour of light (the radiosity and ray tracing techniques). The presentation of the material texture (for example the texture mapping technique) and the use of fractals (e. g. for the clouds) have also been closely involved in the efforts to realism. Using animation techniques in the presentation of views can be supported among other things by noting that it increases the sense of space. As a future trend these kinds of presentations are brought to the earlier stages of design as well as their production is made faster[10].

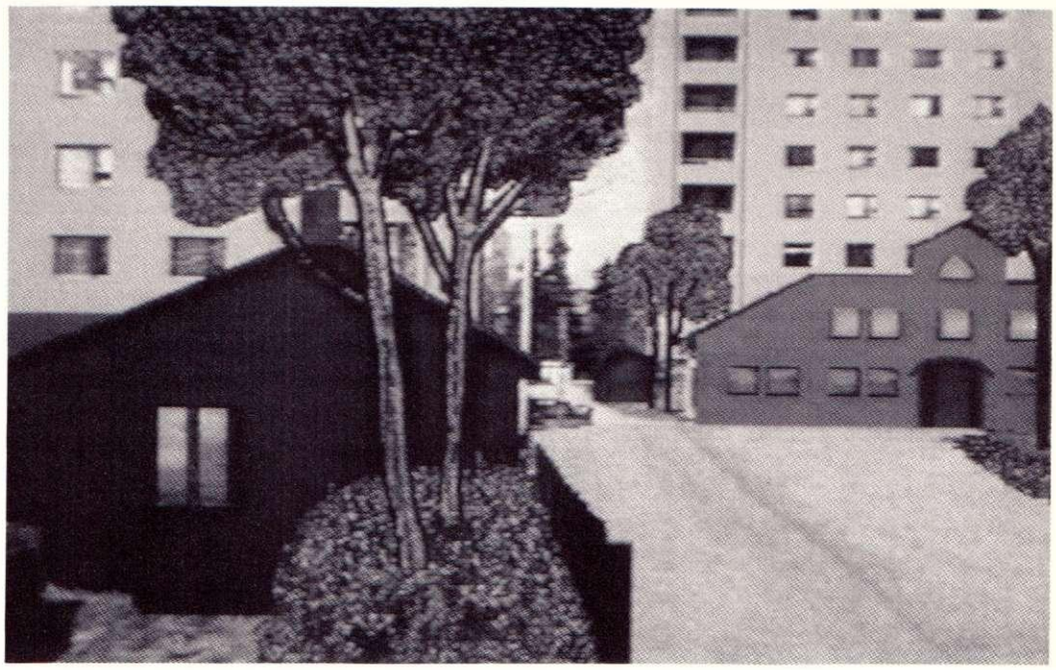
One of the problems in realism has always been the portrayal of natural scenery and vegetation. It can be managed e. g. by using the montage techniques. It is interesting that on purpose of realism one has tried also the paint techniques which resemble manual drawing and their vividness.

Pictures 4–5. Paint technique fits well to present changes in existing environments. Visualization laboratory of Laboratory of Urban Planning and Building Design.

About the archtitects' own intentions

In his work about the semiotics of art (or essentially *pictures*) Altti Kuusamo has paid attention to how certain trends in presentation are common both to the postmodern artists of our time and to the Mannerists of the Late Renaissance[11]. Both have the aspiration to complicate the relations between the manifestation and the contents, and to create manifold meanings. Kuusamo bases his hypothesis of parallel trends partly on research made by Arnold Hauser[12]. Can these kinds of intentions be seen also amongst the postmodernist and deconstructionist architects? I will examine the issue through four well-known architects as examples: Peter Eisenman, John Hejduk, Oswald Mathias Ungers, and Zaha Hadid.

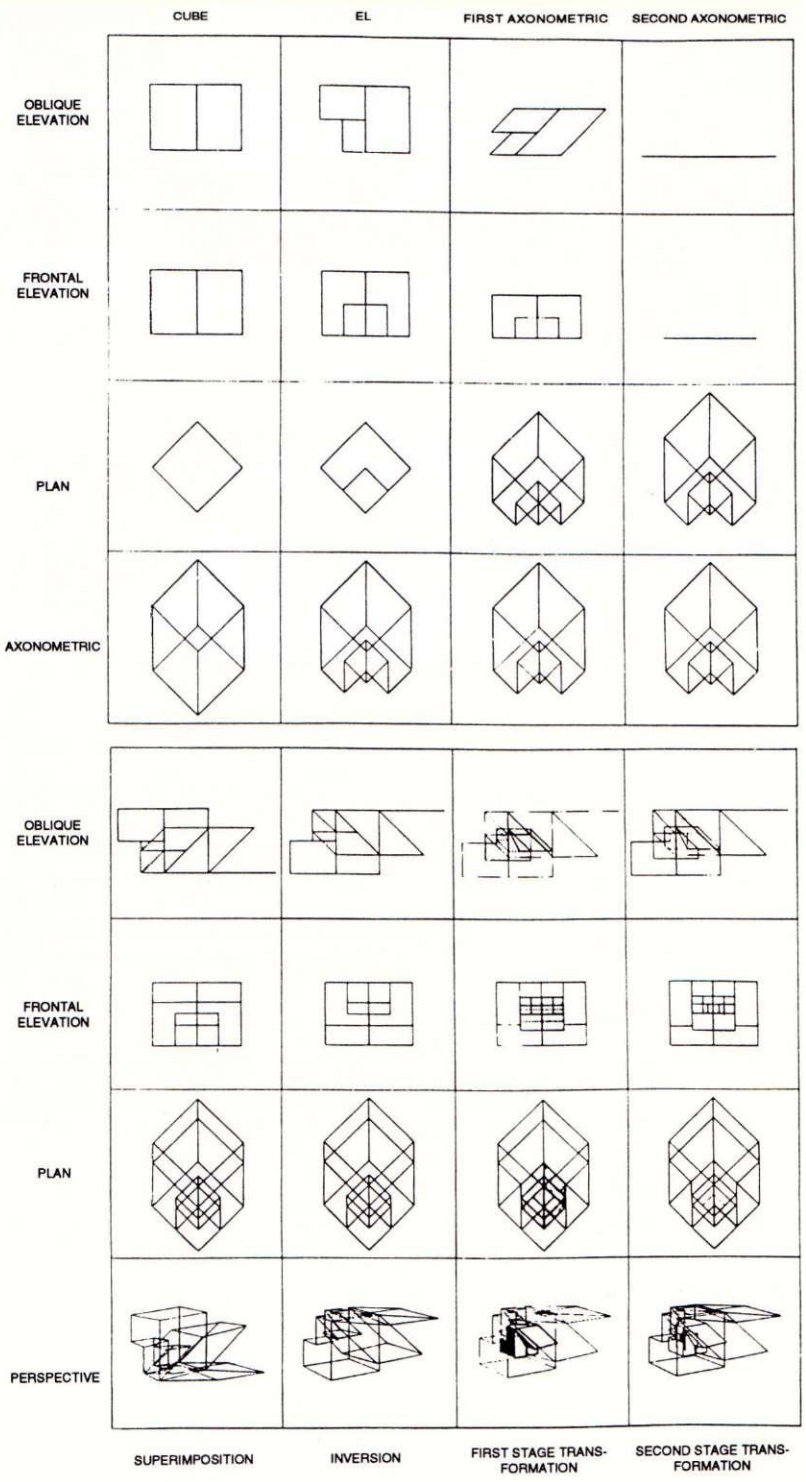
Peter Eisenman is usually thought of to be a practitioner of intellectual distancing. He has tried to make his works complex and has created them as formal systems of relations (e. g. by using a transformative methodology of relations). He has manipulated his subjects by producing analytical diagrammatic presentations. In the background has been a need to reveal the inner logic of the form world as some kind of a deep structure[13]. The dematerialization of subjects and the idea of controlling the form as a notation system are involved in his process. In order to reveal the intended structures he has specially used axonometries. The transformations have consisted of the rotation and the compression of forms among other things. In the *El Even Odd* project Eisenman has used a rather unusual axonometric presentation, where the foundation of the building is at a 45 degree angle



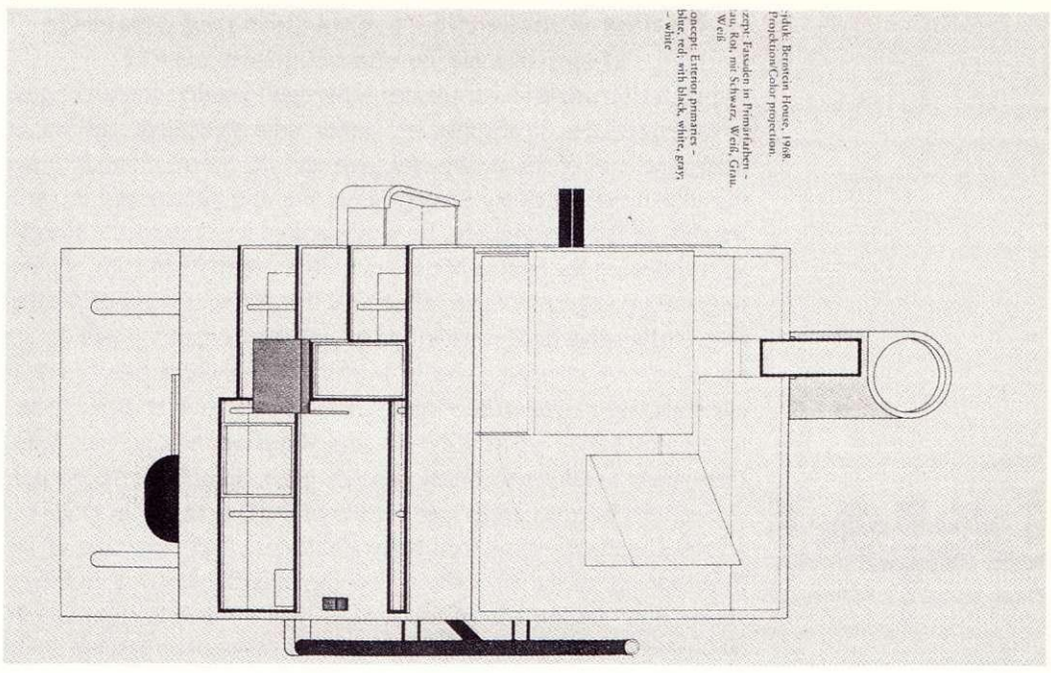
with the picture plane. As a result the diagonals of the cubical building coincide with the vertical angles, as Bernard Schneider has proven. In this case an ambivalent situation is originated where interpretating the nature of the lines and simultaneously the three-dimensional illusion of axonometry tends to change itself into two-dimensionality[14]. Eisenman has also experimented with changing the ambivalent relation between the subject and its representation in an axonometric model.

John Hejduk has in his early works likewise used different kinds of intellectual games in which the frontality and rotations have intertwined and created tensions in his works. When presenting *The House 10* Hejduk used an axonometric form of presention but, like Eisenman, in an unusual way. In his axonometries the inwardly directed lines are not presented at an oblique but at a right angle to the facade. In this way there is an ambivalent situation in the interpretation of the scene: the spectator feels that he is simultaneously seeing a two-dimensional facade and a three-dimensional axonometry. The problem perplexes the spectator and breaks the conventions of presentation.

Oswald Mathias Ungers has commonly used thin, precise outlines in his drawings and often also axonometric presentation. Instead of an attempt to realism there is an advanced stylization in his drawings. He wants to distance the spectator from the subject and emphasize the unreality of the drawings[15]. Breaking the conventions of presentations is also characteristic for him. In his pictures the shadows don't fall to the subject from the sides but from the front backwards and for



Picture 6. Analytical diagrammatic presentations of Peter Eisenman. Bernhard Schneider. *Daidalos* 1981:1, p. 89.



Picture 7. Axonometric presentations of John Hejduk are creating ambivalent situations between the two- and threedimensionality. *Five Architects. Eisenman, Graves, Gwathmey, Heijduk, Meier*, 1975, p. 89.

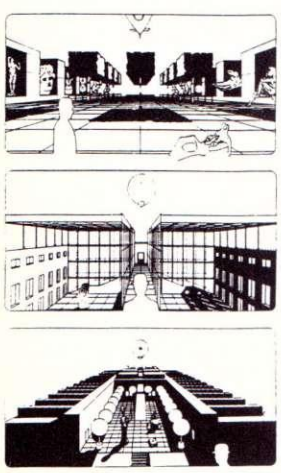
example the hot air balloons are placed so that their locations seem artificial to the spectator. In this way the frontality and symmetricality of buildings can be emphasized.

Zaha Hadid has developed her theories in particular through the parallel use of different ways of presentation as a contrast to the serial thinking which is present in some of Eisenman's forms of presentation. Hadid has tried to capture especially the time dimension. Many of her visualizations resemble computer animations or some kind of exploded presentations. Zaha Hadid herself has said that for her the most important thing is not the realism but the possibility to bring forth new ideas[16]. Here is also involved an aspiration to capture the development of the buildings and relate it to the city fabric. Hadid's visualizations which seem to float free in the air are attached to her architectural ideas about objects floating in space (like her famous *The Peak club building*) and generally to creating the illusion of being freed from the gravity. One of the illustrations in her exhibition catalogue shows the design elements in their descending stages. They are, however, not the same as the so called explosion pictures in engineering drawings (where the parts are presented axonometrically but separated from one another). Kuusamo's idea about the desire for ambiquity and intellectual distancing has thus affected the architects' visualizations.

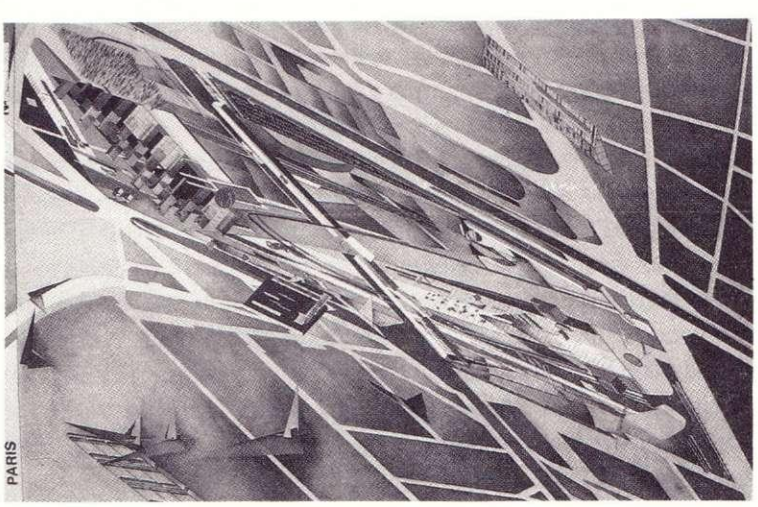
Do new visualization techniques and interests of architects in visualization meet?

Earlier in this article I have noted how the new visualization techniques have been tried to create possibilities for more realistic presentations. Many masters of the postmodernism and deconstructionism make visualizations which try to emphasize the remoteness and the artificiality of the presentation. In addition they try to deny the sensualism and reach the feeling of immateriality. Formerly the arts of painting and photography have influenced the different ways of presenting. On the other hand we could adapt into the computer-aided design for example Eisenman's way of working, in which he tries to create transformations and serial visualizations. The computer-aided visualization offers the possibility of using visualizations as open transformations but this possibility is rarely used. Zaha Hadid's example shows how the idea of perspective views moving freely in space has affected manually produced representations. A comparison of the development of the technology and the intentions of the architects shows how the horizon of the possibilities of visualization is subordinated to the intentions of the architects when *not* moving in the "official" field of visualizations. From an architect's point of view the possibilities of visualization don't seem in any way restricted within realism. However, the architects may try to create realistic presentations when they want to reach specially people who are not professional planners.

The main problem of the new technology is that the techniques develop faster than people learn to use them. The argument is valid also for the visualization. We live in the age of screens and between screens which produce new kinds of pictures. The key issues will be transformation, motion, reincarnation and energy mediated by light, colors and music. Visualizations may create meeting places between people and their thoughs.



Picture 8. Oswald Mathias Ungers will break conventions for example in visualization of shadows. Klotz, Heinrich, 1988, *The History of Postmodern Architecture*, p. 229.



Picture 9. Many of presentations made by Zaha Hadid resemble computer animation pictures. Zaha Hadid, arkkitehti 1988. Suomen Rakennustaiteen näyttelyjulkaisu.

Notes

1. Essu-project (Aesthetically qualified environment and new planning techniques) has been a large project which deals with broad issues of architectural design, environmental planning and applied information technology. Technical Resarch Center of Finland. Laboratory of Urban Planning and Building Design. 1987–1991. Project leader: Hilkka Lehtonen.
2. Lehtonen, Hilkka & Norvasuo, Markku, 1978, *Visuaalisen havainnollistamisen perusteista,* p. 23–34.
3. Burman, Christian & Säätelä, Simo, 1991, *Describing Man-Made Structures.* Technical Research Centre of Finland. Research notes 1240 p. 12.
4. Norvasuo, Markku, 1991, "Arkkitehtuurin tietoteknisten välineiden kehitysnäkymät". In: Burman, Christian *et al. Työkalut ja tietojärjestelmät.* Valtion teknillinen tutkimuskeskus. Tiedotteita 1236 p. 42–43.
5. Glaser, Migges M., 1989, *ART+COM Lab. Report. Berkom Projekt. New Media in Urban Planning* p. 6.1.1–6.1.6.
6. Norvasuo, Markku, 1991, "Arkkitehtuurin tietoteknisten välineiden kehitysnäkymät". In: Burman, Christian *et al. Työkalut ja tietojärjestelmät.* Valtion teknillinen tutkimuskeskus 1237 p. 4–9.
7. Hauptmann, Alexander, 1989, "Speech and Gestures for Graphic Image Manipulation". In: *Human Factors in Computing systems.* CHI' 89 Conference Proceedings p. 241–245.
8. In the experiment one used the 3 SPACE ISOTRAK device, which is being made and marketed by an American firm called Polhemus. The main idea in it has been the input of three-dimensional objects into the computer. The device was connected to the Mac II computer. The experiment included the measuring of the accuracy of the equipment, the digitizing of the footstool designed by Alvar Aalto plus the creation and manipulation of a virtual model in interaction experimenting. Silen, Pär, 1991, "Tredimensionell interaktion med dator i arkitektarbete". In: Burman et al. *Työkalut ja tietojärjestelmät.* Valtion teknillinen tutkimuskeskus. Tiedotteita 1236 p. 168–179.
9. Gombrich E. H., 1984, *Art and Illusion.* 7th ed. New Jersey, Princeton University Press p. 466.
10. McCullough, Jonathan, 1989, *Human-Computer Interaction Issues in Intelligent Computer-Aided Architectural Design.* ECAADE Conference. 1989. Proceedings p. 6.2.1–6.2.18.
11. Kuusamo, Altti, 1990, *Kuvien edessä.* Gaudeamus p. 147–149.
12. Hauser, Arnold, 1973, *Der Ursprung der modernen Kunst und Literatur. Die Entwicklung des Manierismus seit der Krise der Renaissance.* C. H. Beck. München.
13. *Five Architects. Eisenman, Graves, Gwathmey, Hejduk, Meier.* 1975. New York. Oxford University Press p. 16–17.

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14. Schneider, Bernhard, "Perspektive bezieht auf dem Betrachter, Axonometric bezieht auf den Gegenstand. Perspective Refers to the Viewer, Axonometry Refers to the Object". *Daidalos* 1981:1 p. 81–95.
15. Klotz, Heinrich, 1988, *The History of Postmodern Architecture*. The MIT Press. Cambridge, Massachusetts, London. England p. 229–231.
16. *Zaha Hadid, arkkitehti.* 1988. Suomen rakennustaiteen museon näyttelyjulkaisu. Martinpaino p. 14.