

# Computer Renderings – „Reality is Overrated”

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**Abstract.** *In this paper, two problems concerning truthfulness of computer-generated visualization are considered. The first one concerns relationships between reality and its representation by computer renderings. The second problem concerns the kind of representations people need. These problems are analyzed for static perception of architectural forms based on computer visualization, and for dynamic walk-through perception of urban space. The thesis of the paper is that many photorealistic renderings are excessively realistic and thus not true. In this context, a new question arises: do we need the true representation of an object? The author claims that we need “adequate” pictures. Adequate means a picture that is satisfactory in particular situation. The problem of equivalence of media (renderings and animations) and reality is not that important here. Much research is concerned with the truthfulness and falsity of information. However, they do not take into consideration that frequently what seems to be real exerts bigger influence on people than what is in fact real. Understanding this problem may help us in producing images that better correspond to people’s expectations.*

**Keywords.** *Perception, rendering, non-photorealistic rendering.*

## Designing and representation

The main result of designing is a project, i.e. a basis for an object to be constructed. An architectural project describes a future object in detail and in a plain way. “A design solution is the communication of idea. It is the way in which the idea is communicated. The act of communication, its nature, its style, and the very level of its involvement, are deeply linked with design. Such a design solution is a statement made by the architect in this own personal way of communicating. It is an expression of the designer’s creative communicating. The art of communication is inseparable from design.” (Faruque, 1984) In this process, the

architect uses two types of images, iconic and symbolic. Symbolic images are mostly used at the early design stages, as their characteristic feature is ambiguity. Iconic images, which represent objects explicitly, are typical for final design stages, the production of presentations.

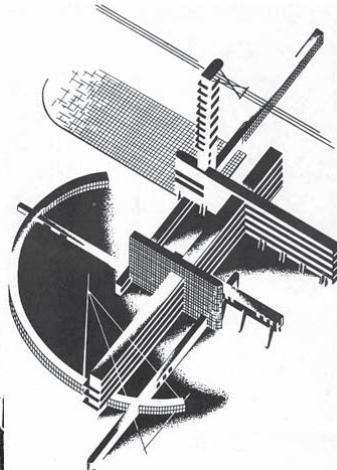
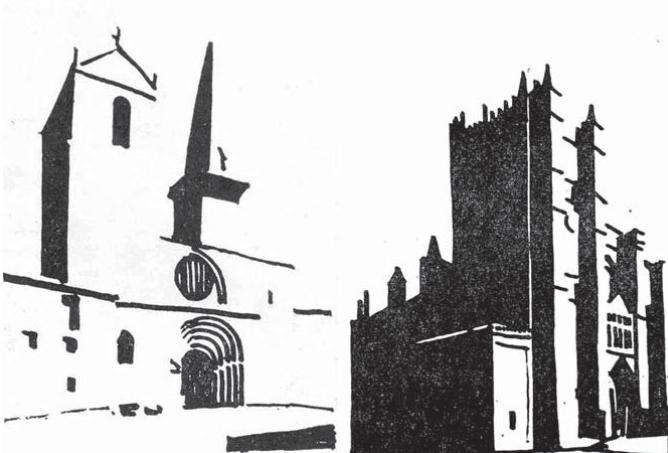
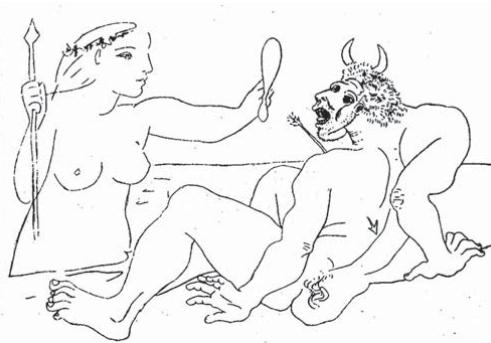
An analysis of past and contemporary architectural projects shows that the only way for presenting design solutions is the graphic technique, which for centuries was the main medium for the communication of design ideas. The graphic language makes it possible to see how an object will look in reality. Paradoxically, the analysis shows that for this purpose architects use both types of images, iconic and symbolic.

## Images

We are living in an era that is characterised by a significant number of visual images. The working of our perception depends on our knowledge or our faith. Mental images, which precede words, can never be fully described and are not simple mechanical reactions to the visual stimulus. Men can establish relationships between things and themselves. Seeing is a dynamic act of choosing during which we answer what is real at that particular moment. As a medium for presentation and transmission of spatial information, we use pic-

tures, photography, movies, television, and computer animations. The old McLouhan definition – “Medium is a message” is still valid.

But, on the other hand, Daniel Boorstin (1987) in his book “The Image: A Guide to Pseudo-Events in America” writes that we are living in a world in which fantasy is more real than reality. He describes how the forged and unauthentic displaces the natural, true and spontaneous. In fact, reality and life become forms of art or entertainment, like television, movies and the radio. In this context, the question arises: what is the association between reality and its representation.



*Figure1. Minimal visual content and maximal expression*

## Visual perception

Arnheim (2004) started his study of Shapes from the statement that we see things surrounded in worlds, and asked, “What means this statement?” Do we see all elements of the information (message) or only some of it? The answer to the question “What do we see when we look?” is very important for understanding how we should visualize architectural forms. According to Arnheim, to see means to capture a few of the most characteristic features of the thing. In a few ordinary lines/strokes, we may see a form.

This is sufficient not only for describing what the thing is but also for perception of its form as a whole, fully integrated form. If we agree with Arnheim that the process of perception is a creative activity of the human mind, we should agree that architectural rendering is not a simple optical/physical projection of a form but a visualization of its features and creation of some equivalent of what we see in the form. A view that there are no differences between a real form and its visual perception may be treated as “Naive realism”. A more adequate theory of adaptation-level was elaborated by Helson (1964). According to this theory, stimuli are evaluated not on the basis of its absolute quality but in connection with their average level for an individual. What will look like an image of a form and how it will look, is defined by the author’s criteria and by what is the picture is meant for. We should remember what Picasso said: “My main goal is always to catch the likeness”. Perception is not based on a photorealistic representation of the form but is a fixation of its general structural features. A camera lens does not see the world the way the human eye does.

## Reality and its representation

The problem of relationship between reality and its representation is not new. We may illustrate it through quotations from different authors, from

Aristotle to Pratchett.

Aristotle, *The Poetics*, “As tragedy is an imitation of personages better than the ordinary man, we should follow the example of good portrait-painters, who reproduce the distinctive features of man, and at the same time, without losing the likeness, make him handsomer than he is.”

Jose Ortega y Gasset – “Velasquez came closer to reality even more than the others, but gave it an unreal charm.”

Jean Baudrillard (1999) - “(...) the photographic image materially translates the absence of reality which “is so obvious and so easily accepted because we already have the feeling that nothing is real” (Borges).”

Janusz Glowacki, (2004) - „At the beginning of our XXI century distinguishing between naturalism and surrealism is more and more difficult. All what I write happens in real world. It is so real that looks unreal.”

Terry Pratchett (2002) - “Reality is not digital, an on-off state, but analog. Something gradual. In other words, reality is a quality that things possess in the same way that they possess, say, weight. (...) The Discworld is as unreal as it is possible to be while still being just real enough to exist. And just real enough to be in real trouble.”

Why can’t we achieve the reality of the object in its rendering?

Because we are never in the real presence of the object. Baudrillard (1999) said, “Between reality and its image, there is an impossible exchange. At best, one finds a figurative correlation between reality and the image. “Pure” reality – if there can be such thing – is a question without an answer. Photography also questions “pure reality.”

Why don’t we need “pure reality”?

Because we never see the “pure reality”. We interpret it and add to it personal meanings. So-called photorealistic representation does not capture it. The reality touches us directly, imposes on us its peculiar illusion, and speaks to us with its original language in order for us to be affected by

its content.

## Media equation

Reeves and Nass (1996) indicate that people have good reason to confuse media with reality. They write that people are poorly adapted to new technologies. Man's mind was developed in a world in which all perceived things were real. All that seemed real was real. Consequently, nowadays, accepting what only seems real is automatic. Media have become good metaphors of reality.

This very important factor influences which kind of visualization people accept. Maximization of reality transmission into a visualization is often ineffective. "Not many men's visual experiences fully depend on excellent visual faithfulness. Always when we have to deal with visually incomplete environment we may use our ability to extrapolation of imperfect images." (Reeves, Nass, 1996)

This observation is confirmed by impressionist paintings (especially those depicting architecture), by the works of cubists in which they present the world in simultaneous ways, and even by traditional sketches and watercolour pictures.

## Computer rendering

In this part of the paper the question, "Are computer-rendered photorealistic pictures really realistic?" will be considered. The problem of reality of renderings may be analysed in two aspects: a static perception of the architectural forms and a dynamic walk-through perception of the urban space. In each case, the relationship between an object and its image, and perception of the two should be analysed.

### Static perception

The main theme of the paper is that many photorealistic renderings of an architectural space are in fact realistic and at the same time not true. The problem is that we do not know what kind of

images we need – realistic, true, or just adequate. An analysis of the 19th and 20th century traditional architectural images shows that these images contain the same information as modern computer renderings, and at the same time are often much more beautiful. This situation corresponds to the question discussed at the Discret web forum, "Is it possible to create in MAX objects which don't look as plastic?" This question concerns the quality of renderings and the synthetic style of computer-generated images.

Many graphic designers who deal with architectural renderings are looking for an answer to this question. One of them, G. Credo (2002) describes the important factors affecting the process of preparing good visualization as follows:

The main goal is to present the architectural design and not to indulge in computer graphic techniques possibilities.

Preparing a wireframe geometrical model is essential. The model should be very detailed and prepared with utmost care. Architectural detail should be analysed from the point of view of its influence on the project as a whole. In many cases, the detailed geometry can be modified to produce more expressive shadows.

We need to select the appropriate materials and textures for the object.

Good choice of shadows allows achieving a natural contrast. We should remember that too many light effects might destroy the simplicity of the picture.

However, at the end of his considerations G. Credo wrote: "After rendering many of the elements are retouched in Photoshop."

As we see, "photoshopping" is one of the most popular techniques in architectural visualization. The break with realism in renderings is supported by software companies, which include in their newest "non-photorealistic" rendering packages options that produce more expressive visualisation.

## **Non-Photorealistic Rendering**

Many researchers think that, “non-photorealistic rendering can convey visual information more effectively than its photorealistic counterparts.” (Wang, 2004) They explore NPR techniques as an alternative to realistic rendering. They concentrate on communicating the content of an image. Techniques that have long been used by artists are now applied to computer graphics to emphasize subtle attributes, and to omit extraneous information. Over time, visual artists have developed a wide variety of valuable techniques for making expressive, and at the same time communicative, images. They include ways of painting, drawing, sculpting, and so forth. In our times, we have more and more to deal with 3D computer graphics tools, which were typically designed as approximations to realistic photographic models. Recently, there has been a growing interest in NPR and in simulation-based media and tools. More and more frequently, we try to combine the expressiveness of natural media with the flexibility of computer graphics. One of the benefits of this way of working is that images have the expressive quality that allows an artist to convey mood and emotion.

The NPR methods may be divided into two groups. The first group encompasses image-space methods, which take as input a still image or sequence of moving images. The second group uses an object-space method based on 3D models of an object or scene. This approach relies on the detection of feature curves. The difference with the image-space approach is that shape information can be easily obtained. Thanks to this, a more accurate NPR representation of the 3D scene is easier to prepare. As mentioned before, this method requires the construction of 3D models. In both methods, strokes generated with synthesised brushes, which can have various sizes, shapes, colours and pressure are used. This way of working mimics hand painting style (oil painting or watercolour) or the sketching style (pen-and-ink). The sketching style generates an effect

similar to sketching with pen and pencil. Its goal is to represent the inherent object detail. The output is usually a black and white image. Contrary to the sketching style, the painting style produces colour images.

## **The movie**

For better understanding of perception of dynamic images, we start with a quotation from the father of “cinema verité”, a documentary movement in 60s and 70s, Dziga Vertov (born in Bialystok 1896).

“Me –a „cinema-eye”. Me - „mechanical-eye”. Me, machine, showing you the world as only I may see. Since today, I break free of humans’ immobility. In sustained motion I came to the thing and move away, crawl under it and climb up, I run along with a horse at full gallop. (...)I fall down and fly away together with falling and rising bodies. Here I am, camera, run along line, dodging between chaos of motions and fix motion in its complex configuration. Freed from bonds of time and space, I put together all, that only I can catch, points of universe. My goal is to create new way of perceiving the world. This is how I decode in new way unknown world.” (Vertov, 1923)

The main goal of Vertov was the “capture of the true” as a montage of pieces of reality. He believed that the camera should be emancipated, as it was more perfect than the human eye.

## **Time and space**

The dynamic perception of the urban space will be analysed at the basis of an exercise performed within a Digital Architectural Composition Course at the author’s Faculty of Architecture. The goal of the exercise was to design 3D abstract forms in a given urban space and to create a path through this space. The space consists of two streets, each 200m long, and a square 200x200m in between. Students were putting a camera into the scene trying to create the best path of camera movement

(walk-through) for presenting the space.

The results were very surprising to most of the students. They realized that the forms they created were invisible in many cases, so they had to start the whole creation process again.

But even after modifying the projects, perception of the space created by the students was not truly adequate. There are two aspects of this phenomenon. One aspect concerns the duration of the walk-throughs. The total time of most of the animations is about 2-3 minutes. The time was too short since in reality a man needs 6 minutes to walk 600 meters. When some students prepared longer animation, they observed that they were too long, so that nothing interesting was happening. Moreover, they said that watching such long movies was tedious.

Another source of inadequacy was the camera focus used in animation. For a bigger expressiveness of the movies, most of the students were changing the camera focus during the walk-through from 22 to 200 mm. But in reality, man's view frame is permanent and is restricted in the horizontal plane by a 60 degree angle and in vertical one, by 30 degrees from the horizon level. This is an equivalent of a 50 mm camera zoom. The students were then asked to make an animation with a blocked camera focus, in order to check what would be really visible from the level of a man's eyes while walking. The resulting perception was true but again tedious.

Maybe Vetrov's way of working was right. He believed film to be the most important medium for the conveying of ideas. Vetrov's technical work with the camera was also ahead of its time. He experimented with slow motion, camera angles, enlarged close-ups, and crosscutting for comparisons. Vetrov attached the camera to locomotives, motorcycles, and other moving objects, and he held shots on the screen for varying lengths of time. Vetrov refers to the camera as being pitifully enslaved and subjugated to the imperfect and not too clever human eye.

## **Determinism**

Another aspect of truthfulness of dynamic images perception is the linear character of the movie, whereby the camera-produced pictures became the material for director's argumentation. Through the pictures, the movie leads spectators to the director's conclusion, the director's truth. Berger (1972) expressed this when he remarked that in traditional animation the way in which pictures follow each other (its order) creates an irreversible argumentation.

One way to break this kind of determinism is to use VRML techniques. A VRML presentation is more neutral medium because it does not impose the authors' way of seeing, and at the same the spectator is more involved in perception of the images. The audience becomes the director of its own spectacle. The reason for this is that the choice criteria are very personal. Each spectator needs different time for watching a scene. VRML permits both simultaneous and individual perception.

## **Conclusion**

The problem of equivalence of media (renderings and animations) and reality is not that important. The important issue is if renderings are perceived as reality. "Right You Are (If You Think You Are)" (Pirandello, 1917)

Many researchers are concerned with the relation between truthfulness and falsity of information. But they do not take into account that many times what seems to be real exerts a bigger influence on people than what is actually real. Understanding this problem may help us prepare images that better correspond to people's expectations.

If we look at the potential of photorealistic renderings, we can see that photorealism does not mean truth. But do we need the true presentation of the object? Impressionistic pictures are not realistic but at the same time show more adequate visions of the world. We may propose a thesis that

we need “adequate” pictures. “Adequate” means in this case a picture that we need in particular a situation (determined by the purpose for what the picture is created). True pictures are much more difficult to produce. They need a deeper psychological research in the field of theory of perception, emotions and reasoning.

Considering the problem of the truthfulness of computer animation, we have observed a discrepancy between walk-through movies and real perception of the urban space. In our teaching experiment, we have found that movie techniques, which should be used for presentation of architectural spaces, are treated by students as a kind of show-business, the main goal of which is to win over the public (teachers in this case). Most of the student works did not present the truth of designed space. The results show that Hearst was right when he said, “Reality is boring”.

## References

- Arnheim, R.: 1974, *Art and Visual Perception. Psychology of Creative Eye*, The Regents of the University of California, Polish translation: *Sztuka i percepcja wzrokowa*, Gdansk, 2004.
- Asanowicz, A.: 2003, *Architectural Composition in Digital Space*, in W. Dokonal and U. Hirschberg (eds), *Digital design, Proceedings of 21st ECAADE Conference, Graz, 2003*, pp. 587-594
- Baudrillard, J.: 1999, *La Photographie ou l'Ecriture de la Lumiere: Litteralite de l'Image*, in: *L'Echange Impossible. Espace critique*. Paris, Galilee, , pp.175-184.
- Berger, J.: 1972, *Ways of seeing*, Penguin Books.
- Boorstin, D.: 1987, *The Guide to Pseudo-Events in America*, Atheneum, New York.
- Creoz, G.: 2000, *Portfolio, Computer Arts, 2*, (Polish edition), pp.46-47.
- Faruque, O.: 1984, *Graphic Communication as a Design Tool*, Van Nostrand Reinhold Company, New York.
- Glowacki, J.: 2004, *Z glowy, Swiat ksiazki*, Warsza-

wa.

- Helson, H.: 1964, *Adaptation-level Theory*, New York.
- Pratchet T.: 2002, *Moving Pictures*, HarperTorch, New York.
- Revees, B., Nass, C.: 1996, *The media Equation. How People Treat Computers, Television, and New Media Like Real People and Places*. Cambridge University Press, Polish translation, *Media i ludzie*, PIW, Warszawa, 2000.
- Wang, H., Zhang, J.J., Li, S.Z., Wang, Y.: 2004, *Shape and texture preserved non-photorealistic rendering, Computer Animation and Virtual Worlds*, 15, pp.453-461.
- Vertov, D.: 1976, *Czlowiek z kamera. Wybor pism*, Warszawa.

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